

CONVENTION ISSUE

INFORMATION LETTER

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Proceedings of the 44th Annual Convention

Mobilization of Industry for Defense Is Keynote of Most Convention Sessions

The 44th Annual Convention of the National Canners Association in Chicago February 14 to 23 was much like the Processors' Conferences of World War II.

Mobilization of the canning industry for its part in emergency defense programs was the keynote of nearly every program session and the meetings uniformly drew capacity attendance. Emergencies arose during the Convention itself and became the occasion of special sessions quickly summoned. The N.C.A. War Mobilization Committee and several of its functional groups convened many times during the week.

The Association presented government representatives—in most cases the key officials—of the major control programs, booked them on important programs and provided them offices in

Convention Announcement

The 1952 Convention will be held in Atlantic City during January and the 1953 Convention in Chicago in February.

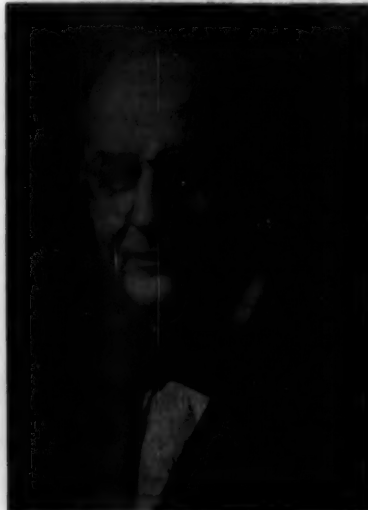
Further details will be worked out by officials of the three sponsoring associations—the National Canners Association, National Food Brokers Association, and Canning Machinery & Supplies Association, and will be announced later.

the Stevens Hotel, where they and members of their staffs could receive individual canners for conferences and discussions of current problems. Thus, Convention delegates heard speakers on the role of canned foods in civil defense, on procurement, on agricultural phases of production, on container conservation, on manpower and on price

CARLOS CAMPBELL
Secretary-Treasurer

HERBERT J. BARNES
1951 President

FRED C. HEINZ
1951 Vice President



President Taylor Complimented by Many

One of the fraternal traditions of N.C.A. Conventions is the presentation of a gift and appropriate remarks of appreciation to the retiring President. This takes place following the installation of new officers and concludes the General Session.

Henry P. Taylor, the 1950 President, was eulogized by the Resolutions Committee. His work was praised by his successor in office, H. J. Barnes, when the President-elect was handed the gavel of new office. Senator Byrd, guest speaker, had fine things to say about his old friend and fellow Virginian, as he rose to speak.

But one of the happiest of these many laudatory phrases was turned by Oliver Willits, when on behalf of the Association he presented Mr. Taylor with a handsome pair of leather traveling bags. Among other gracious remarks, Mr. Willits said:

"Henry Taylor has the serenity to accept the things he cannot change; but the courage to change the things he can, and the wisdom to recognize the difference."

control, and were enabled in addition to confer individually on these matters.

Continuous Procurement Sessions

One of the most active subjects of the Convention was the matter of canned foods procurement by the armed forces. The N.C.A. War Mobilization Committee, which held two over-all meetings, authorized the calling of a Special Procurement Session at which Brig. Gen. Everett Busch, Commanding General of the Chicago Quartermaster Depot, set forth to a capacity audience of canners and distributors the immediate supplementary needs of the Army QMC. S. R. Smith, Chief of the Fruit and Vegetable Branch of PMA, spoke briefly in support of the Quartermaster's plea for offerings it was hoped could be made before the Convention adjourned.

There was an active response to the call in spite of the fact canners' stocks were heavily sold. The Association arranged for the expansion of room facilities in the hotel for Quartermaster Corps officials and for the two days, February 20 and 21, the Quartermaster offices became one of the busiest spots of the Convention. More than 135 companies made firm offerings there, and about 200 more indicated they would submit offerings after ascertaining inventory status.

By February 21 the unprocured balance of lima beans, snap beans, carrots, and sweet potatoes had been greatly reduced and some reductions had been made in corn, peas and spinach. Tomatoes, juice and catsup were still greatly needed.

The procurement effort was continued after the Convention closed. Secretary Campbell and Chairman Fred C. Heins of the War Mobilization Committee's Procurement Functional Group issued a letter of appeal to canners to make offers not later than March 9, pointing to the manifestation that had been made at Chi-

cago of industry unselfishness and cooperation in the public interest. The letter, which appears on page 126, listed the products in which the Quartermaster is especially interested, showing the unprocured amount as of February 26 and the stocks of these items on hand February 1.

Machinery Priorities

Another defense project originating at the Convention and under completion now at N.C.A. headquarters in Washington has to do with priorities for canning machinery and equipment. In the closing days of the Convention period, the N.C.A. War Mobilization Committee's functional group on Canning Machinery, of which G. C. Scott is chairman, met with a committee of canning machinery manufacturers to assemble information about materials that will be needed to ensure machinery to operate canneries. A list of such items has been prepared and submitted to the government for use as the basis for establishing priorities and allocations.

Container Problems

The situation regarding metal containers and the government orders limiting their use was thoroughly explored in the special meetings of the War Mobilization Committee; the program presentations of NPA officials, and at the Monday morning open meeting of the Containers functional group under Chairman Oliver Willits.

Mr. Willits remained in Washington until Sunday, February 18, but advised the War Mobilization Committee constantly by telephone regarding developments.

The War Mobilization Committee passed a resolution requesting the insertion in tinplate export contracts of a clause requiring that whenever a foreign country receives tinplate, that country be placed under the same

restrictions that apply to the use of tinplate in this country.

At the meeting of the Containers Group of the War Mobilization Committee, with Chairman Willits presiding, Charles A. Lewis and Robert J. Small of the National Production Authority answered questions from canners. They gave their interpretation of certain portions of M-25. Mr. Lewis described the tin supply situation as it relates to the current tinplate specifications for canned foods and pointed out that if the second quarter cutback in the use of tin which had been asked of their division were applied and all nonfood items eliminated as users of tin, the supply would be considerably short.

In the meeting of the N.C.A. War Mobilization Containers Group, it was pointed out that tin production was satisfactory but the price was too high for purchase as a result of speculation.

In this connection, the N.C.A. War Mobilization Committee severely criticized government policy that permits other countries to buy tin for speculation, while allowing U. S. imports to be reduced. Efforts are being directed by Mr. Willits' Container Group toward obtaining more tin for the U. S. from the world supply so that the stockpiling program can be fulfilled without requiring the canning industry to drastically curtail its food production.

Canned Foods Pricing Problems

An important addition to the General Session was a special Clinic on Government Price Controls, conducted by War Mobilization Committee Price Chairman E. A. Meyer. Like all Convention sessions, it was attended by a capacity crowd. Questions on all phases of canned foods pricing problems were presented to a Panel of OPS and USDA officials, and answered by them through a battery of table microphones. Members of the Panel were:

From OPS: Edward F. Phelps, Jr., assistant director in charge of Commodity Divisions; Geoffrey Baker, consultant; Wayne E. Rice, consultant; H. K. Bachelder, head of Processed Fruit and Vegetable Section; and Alger Pike, head of Fish Section.

From USDA: S. R. Smith, Chief, Fruit and Vegetable Branch, PMA; Don Rubel, Chief of the Fruit Division, PMA; Kenneth Scheible, Chief of the Vegetable Division, PMA; and Eldon Shaw, Fruit and Vegetable Branch, PMA.

From Interior: Maurics Rattray, Deputy Administrator, Defense Fisheries Administration.

Mr. Meyer earlier had reported to the War Mobilization Committee on plans to have separate fruit and vegetable subcommittees set up with the distinct understanding that neither group would proceed without full

knowledge of the other as to its thinking. He reported that it would probably be six to eight months before the government could have a pricing program in operation. Meantime, the functional committee, it was felt, would be able before long to reach the point in its activities where it would want the over-all Committee to consider questions of policy affecting the whole industry.

Manpower Problems Presented

A well attended informal discussion of labor supply and manpower problems was held under the chairmanship of John F. McGovern of the Manpower Group of the War Mobilization Committee on February 19. Representatives of the United States Employment Service, National Headquarters of Selective Service, and the Immigration and Naturalization Service contributed to the meeting by reviewing their respective functions and answering questions.

Donald Larin, Chief of Farm Placement, USES, reported on the January 26-February 3 discussions in Mexico City and outlined the intergovernmental understandings reached with respect to the use of Mexican nationals this year. Senator Allen J. Ellender (La.), Chairman of the Senate Committee on Agriculture, and Representative W. R. Poage (Tex.), Chairman of the Special Farm Labor subcommittee of the House Committee on Agriculture, were present at the Mexico City discussions. Under the agreement reached at Mexico City, legislation will be recommended under which the United States government will guarantee Mexican workers the obligations of the employer pursuant to individual work contracts. This type of program, the Mexican delegation indicated, must become effective by July 1. It was agreed that the new program for Mexican workers will provide for the United States government paying transportation costs of workers from interior points of recruitment in Mexico to the border and for the waiver of immigration bonds covering the departure of workers.

Col. Lewis F. Kosch, Chief of the Manpower Division of Selective Service, reviewed the present draft act and pointed out the necessity for employers to give local draft boards complete information regarding employees eligible for selection but essential to agriculture and agricultural processing.

Other Emergency Actions

The War Mobilization Committee, besides authorizing special meetings on emergency problems, and guiding its several functional groups in many Convention programs and activities, heard discussions of a number of inter-related subjects.

Chairman Howard T. Cumming announced that on the organization side it had been decided to combine the subcommittees on Crop Control and Price Support with the one on Wage and Price Controls, but that in making that change, another committee would be set up to deal with agricultural questions not directly connected with price, with Stran Summers as chairman.

After discussion of the subject of certificates of necessity, the War Mobilization Committee authorized the preparation of a letter to government authorities, urging that consideration be given to each application for a certificate of necessity, on its merits rather than on an over-all industry potential.

Chairman Cumming brought into the discussion the matter of the emergency war clause that was used by canners in sales contracts during World War II and asked for consideration of a similar clause to be recommended for use by the industry in the present emergency. The Committee voted approval of the new clause and it was also given approval at the meeting of the Board of Directors. Text of the war clause is reproduced at right.

Opening Program Sessions

The first program session of the 1951 Convention was the Special War Mobilization Conference, Saturday afternoon, February 17, presided over by President Henry P. Taylor. This session brought to an audience of canners that packed the North Ballroom of the Stevens and overflowed into balcony, adjacent rooms and corridors, the statements of the various government defense administrators on many phases of emergency control.

These papers are reproduced in the section of this issue of the INFORMATION LETTER which begins on page 52.

The General Session

On Sunday afternoon, February 18, the General Session of the N.C.A. was held, also in a packed hall. It began with a special tribute by President Taylor to the late Frank E. Gorrell and included Mr. Taylor's address; that of Senator Harry F. Byrd of Virginia, the guest speaker; a special appearance by Ralph S. Trigg, Administrator of the Production and Marketing Administration, USDA; the report of the Committee on Nominations by Chairman Cumming; the election of officers; and the report of the Committee on Resolutions by Chairman Chester A. Ray. All of the foregoing items are reproduced elsewhere in this issue.

The session closed with the installation of the new N.C.A. officers. The new Vice President, Fred C. Heinz, was unable to be present. He had

(Please turn to page 124)

Recommended War Clauses For Sales Contracts

The N.C.A. War Mobilization Committee concluded that the present emergency conditions warrant the recommendation to individual canners of a war clause similar to that in canners' sales contracts during World War II.

In 1942, Association Counsel prepared a revision of the original Emergency War Clause developed in 1939 for use in canners' sales contracts. The changes made at that time recognized the fact that the United States had become a belligerent (see INFORMATION LETTER of June 20, 1942, page 7065).

It is believed that the following provision, which recognizes the peculiar facts of the present situation, would be appropriate for use by canners.

"If, during the present national emergency or during any period of industrial mobilization arising out of threats to the national security, (1) Seller's factory or factories or all or any portion of Seller's production are commandeered or requisitioned or reserved or otherwise acquired by the Federal Government or any agency thereof; or (2) Seller's production or sales are directly or indirectly regulated or restricted by the Federal Government or any agency thereof, or in any way limited by regulation or restriction of needed commodities or services; or (3) Seller in compliance (whether such compliance is mandatory or not) with any government order, request, allocation, limitation order, conservation order, priority order, rationing order, reservation order, contract, allotment, notice, or "friendly commandeering," delivers to or reserves for the Government, or agencies or persons designated by the Government, all or any portion of Seller's production; or (4) Seller with reasonable effort and at reasonable cost is unable to obtain the raw materials, supplies, fuel, labor, or transportation necessary to enable it to fulfill its contracts; and as a result, Seller is unable to fulfill all of its contract commitments to all purchasers of any article covered by this contract, whether such contract is executed prior to or following any such government action or request, Seller may pro-rate among all such purchasers its available supply, if any, of such article, and a delivery of Buyer's pro rata share, if any, shall constitute a full performance of this contract. If under any of the conditions specified there is no available supply to be pro-rated, Seller shall not be liable for failure to deliver."

WAR MOBILIZATION CONFERENCE

CANNED FOODS IN CIVIL DEFENSE

By Dr. E. J. Cameron, Director,
Washington Research Laboratory,
National Canners Association

All civil defense plans call for supplies of protectively packaged foods for use in emergency. The packaging requirement may vary according to the defense needs to be anticipated, but hermetically sealed tin and glass containers provide the most complete protection against the three kinds of warfare that may create a serious food contamination problem.

Civil defense planning takes into consideration the possibility of atomic bomb attack, and of biological and chemical warfare. Any of these three kinds of attack will result in the contamination of food if it is imperfectly protected. The problem of complete protection is only partially solved, however, by the prevention of direct contact between the food and the radio-active, biological, or chemical contaminant. To assure complete safety it must be possible to remove the contaminating material from the exterior of the container before it is handled for opening.

Atomic Warfare

An atomic bomb burst may cause radio-active contamination of food in various ways, the most important from the food standpoint being that from "residual" radiation. When detonation of the bomb occurs, the material from which the bomb is made breaks down into a great number of simpler radio-active elements, forming a cloud which slowly precipitates over the bombed area. This radio-active dust contains the "residual" radiation against which the food must be protected.

Following the detonation of an atomic bomb, packaged food which remains intact will be fit for consumption while unprotected food and drink in the area must pass examination with a radiation detection instrument before they are safe to use.

The problem of protection, as we have seen, is only partially solved by prevention of contact between the contaminating agent and the food. Radio-active dust clings tenaciously to anything with which it comes into contact. It is of itself dangerous to a person who handles an object upon which it has settled. Therefore, in order to insure complete safety, the food package itself must be thoroughly cleaned before opening and it is also necessary that this be done so far as possible without contact with the skin during handling.

Rigid, hermetically sealed containers serve not only to prevent contact between the radio-active dust and the



DR. E. J. CAMERON

food or drink but they can be cleaned externally by immersion in soap and water or, preferably, a solution of some household detergent such as Tide, Vel, or Dreft. Such cleaning and the use of a can opener or cap lifting device which has been similarly cleaned overcomes the danger of contamination in opening the container and transferring the food.

Biological Warfare

Biological warfare agents which might be employed against people include a wide variety of disease-producing bacteria and soluble toxins (bacterial poisons). They could be delivered through the air, food, or water. Acts of sabotage would be responsible for direct transmission of biological agents through food and water. Direct attack would be made by transmission in air.

An attempt to transmit biological agents through the medium of heat processed foods would be basically so impractical as to remove the possibility from consideration. Aside from the great difficulty in accomplishing sabotage by contaminating products before canning, heat processing would destroy any of the viruses, bacteria, or lethal toxins that might conceivably be used.

In distributing biological agents through the air they could be disseminated by aerial bombs and other munitions, or by the release of aerosols (on the principle of "insect bombs") from planes or ground devices. Whatever the agent used and however it became

disseminated, the chief reliance for subsistence in the area would have to be placed upon packaged food until disrupted transportation facilities were restored and new food supplies became available.

Here again, the facility of cleaning hermetically sealed containers by immersion would be of great advantage. This would be true particularly where the presence of infective bacteria was suspected. Under these circumstances great effort would have to be applied to eliminate all possible sources of infection within the area, and to prevent its spread. Canned food containers could be sterilized readily by simple immersion in a sterilizing solution.

Chemical Warfare

In considering the problem of civil defense against chemical warfare, planning thus far has centered on one group of chemical agents—the nerve gases. It is to be expected that measures necessary to protect food against these gases would apply generally to protection against other chemical agents that might be used.

The nerve gases are more toxic than any previously known war gases. They are liquids and yield toxic vapors when they evaporate. From what is known regarding their stability, they may dangerously contaminate exposed foods of high water or fat content. Here again, for such foods, protective packaging is of great importance. According to a release from the Federal Civil Defense Administration (*Health Services and Special Weapons Defense*, Publication AG-11-1, page 33), "Foods in airtight packages are not contaminated by nerve gas vapors, but only those in sealed glass or metal containers are safe from liquid nerve gas."

Canned foods and food liquids are an essential commodity in civil defense. In their protected form they can supply safe solid food and liquid and provide balanced nutrition for the indefinite periods that may be expected as the result of disrupted distribution facilities caused by enemy attack.

The feeding of people and the satisfaction of their drink requirements in an emergency area will be of importance second only to that of medical care, and the immediate availability of an uncontaminated food supply will become a requirement for the unevacuated population.

Canned food containers are resistant to rough handling and the tin container will withstand considerable blast. Hermetically sealed, these containers will protect the food effectively against all of the kinds of attacks involved in civil defense planning: Atomic bombing, biological warfare and chemical warfare.

Not only does the hermetic container protect the food, but being rigid

and water-proof it is adapted to quick and simple washing, or sterilization, by simple immersion in easily prepared solutions.

The internal protection which they possess coupled with the ease of attaining external protection, gives canned foods a unique importance in meeting the problem of emergency subsistence.

THE ARMED FORCES LOOK TO AMERICA'S CANNING INDUSTRY

By Maj. Gen. Herman Feldman,
Quartermaster General of the Army

It would be difficult for me to exaggerate the importance which we in the Army Quartermaster Corps attach to this war mobilization meeting of your Association.

It is my responsibility to provide the armed forces with food. Since food is the basic requirement of the military services, just as it is for all human beings, the very defense of our nation depends upon adequate supplies of this fundamental commodity.

If our troops are lacking in food, in quality or quantity, if it is not supplied them every day, in the types demanded by the circumstances in which they are engaged—properly prepared, packaged, and delivered—we may be forced to pay a high price for our derelictions in battles lost and casualties sustained.

Just as it is our responsibility to deliver these supplies, it is the responsibility of the food industry of the United States—from the farmer who grows the crops through the manufacturer who processes and packages them—to make these supplies available.

It is my feeling, therefore, that our meeting here today presents an invaluable opportunity to consider the many problems presented by the mounting requirements of the armed forces. I sincerely hope that the discussions in which we engage can be frank and detailed. It is my purpose to tell you our plans and objectives and to acquaint you with our principal problems. I earnestly wish you to reciprocate by acquainting us with your problems. Such a free exchange is typical of our American way of life. It is one of the things that has made this country the greatest nation in the world's history.

When troops are committed to battle, the importance of the packaged food becomes transcendent. While they are stationed at organized posts and camps in the United States, or are assigned to garrison duty overseas, the bulk of their rations are fresh foods, just as it is in your own homes. But when they are committed to field or combat action, it naturally follows that recourse must be had to

Source Material

United States Civil Defense, National Security Resources Board, 1950.

Health Services and Special Weapons Defense, Publication AG-11-1, Federal Civil Defense Administration, 1950.

Radiological Defense, Vol. III, The Armed Forces Special Weapons Project.

Lectures from course of Medical Aspects of Nuclear Energy given by Army Medical Department Research and Graduate School, 1950.



MAJ. GEN. HERMAN FELDMAN

processed and packaged subsistence.

And so the soldier up there in the front lines must depend for his strength and vigor and perhaps his life, upon the food which the canning industry prepares for him. It must be nourishing. It must be wholesome. It must appeal to his appetite. It must be in sufficient quantity and, of course, it must not have spoiled before he opens the can.

I have been delving somewhat in the history of the canning industry and find that it not only received its initial impetus from military necessity, but many developments and improvements likewise were spurred by military needs.

Back in 1795, none other than the little corporal, Napoleon Bonaparte, found that his troops were suffering from hunger owing to a meager diet

of smoked fish, salt meat, and hard bread. He realized that much of this suffering could be avoided if the troops could be provided a more varied, nutritious diet. The French Government, therefore, offered a prize of 12,000 francs to the person who could develop a process of preserving that would insure supplies of good food.

The prize, as I understand it, was awarded to one Nicholas Appert, who devised a method of preserving meat, fish, vegetables, fruits, and eggs in liquids contained in bottles or jars which were corked with great care and made air tight. Since Napoleon's time, a close link has been maintained between military needs and the food processing industry. In the United States, the cooperation always manifested by the canning industry has been a matter of the greatest satisfaction to the Army.

During each war in which the United States has engaged in the past century, and particularly in both world wars, the amounts of canned foods produced in this country attained new record heights because of the impact of military requirements. Now, with a new emergency facing the nation, the canning industry is again being called upon for the essential food products necessary for the defense of the country.

My office recently announced the tentative quantities of canned fruits and vegetables which the armed forces will require from the 1951 packs and the canned juices from the 1951-52 packs for consumption during 1952.

These quantities are several times the amounts required during the pre-Korea era, and, at first glance, they may appear to be larger than warranted by the increased strengths of the services. This is a point often misunderstood and misinterpreted and I would like to clarify the picture.

It must be borne in mind that, in addition to feeding the increased strength of the armed forces, it is necessary to fill the supply pipeline and reserve levels for the increased forces.

An even more important factor is the transition in combat and other overseas areas from perishable to non-perishable items. Normally, in the United States, approximately 70 cents of the military ration dollar is spent for perishable such as frozen meats, fresh fruits and vegetables, and fresh eggs. When refrigeration is unavailable or limited as in overseas combat areas, the entire ration dollar is spent for nonperishable food, or, one might say, "the dollar goes into the can." It is the increased demand of pipelines and the conversion to nonperishable food which increases military canned food requirements in time of emergency out of proportion to the increased strength of the services. To

General Feldman was detained in Washington by pressure of official duties and was unable to deliver this address. It was delivered by Brig. Gen. Everett Busch, Commanding General, Chicago Quartermaster Depot.

this, we must regretfully add, the losses of supplies due to enemy action.

The cooperation of the food industry during the trying past six months has been highly gratifying to me. The military demands for large quantities within very short delivery dates have been met by industry with a high degree of success. For this you have my sincere appreciation.

The armed forces, on their part, have reviewed all purchasing policies and procedures with a view to broadening and accelerating the availability of supplies. Negotiated purchase has replaced formal advertising except where conditions warrant a finding that formal advertising is in the interest of the government.

In the past, certain elements of the food industry have hesitated to negotiate with the government because of the provision that such negotiated purchases shall be renegotiated as to price at a later date. I was pleased to note recently that one large interest in the canned food industry, which formerly would respond only to formal advertising, will now negotiate. I hope this is an indication of a trend within the industry toward negotiated offerings which will simplify and accelerate the procurement of canned foods by the armed services.

The organization of field buyers traveling out of Quartermaster Purchasing Offices has been expanded. This is a direct effort to reach the small businessman—the small canner—and to purchase his products under conditions most suitable to him. Purchase f. o. b. origin as well as f. o. b. destination conforms to trade practice in the canned fruit and vegetable industry and has facilitated negotiated purchases in the field.

During the period in which the solid fiber box industry was converting and expanding to produce V2S boxes with sleeves, which is the required export combat pack, we were able, by purchasing f. o. b. origin, to hold the canned foods at packers' plants until the export cases became available.

Defense Orders, referred to as "DO orders," were made applicable to the packing and packaging of subsistence including operational rations, of items purchased by specification for troop feeding, and of brand-name items purchased for resale by overseas commissary stores. These orders have insured the delivery of fibreboard, strapping, and foil—items of limited availability.

With all of the actions which I have named, there still has been difficulty in obtaining military requirements of canned foods. It has been necessary temporarily to relax on certain purchases by waiving the desired V2S with sleeve, export packing, and accepting V3S boxes with sleeves. It has also been necessary to drop to a lower grade than desired on certain

items and to accept can sizes available in the commercial market which were not the sizes most suitable to the armed forces supply systems.

To obtain certain specific items such as corn and tomato products, I have personally appealed to individual canners to offer the quantities we require from the 1950 packs. The response has been helpful and I want to thank all of those who participated. In the case of tomato products, it has been necessary to make off-shore purchases so as to assist in bridging the months until the 1951 pack becomes available.

As I look forward to the requirements of the armed forces from the 1951 packs, I believe the problems of material shortages in fibreboard, strapping, and foil will be solved by the actions already initiated.

My staff is studying the effects of the tin conservation order, M-25, on the suitability of canned foods for the armed forces. I am sure all of you understand that the multiple handlings and storage under adverse conditions to which military foods must be subjected require protection against exterior corrosion far in excess of that necessary in domestic food distribution channels. If it is found that cans made under conservation order M-25 do not have the necessary stability to meet military requirements, and that the problem can not be solved by pre-coating or pro-coating, an amendment to the order as it pertains to requirements of the armed forces will be recommended.

I will ask the Department of Agriculture to exercise its authority under the Defense Production Act of 1950 to invoke set-asides for annually packed canned fruits, vegetables, and juices. These set-asides will be a percentage of the pack during a base period prior to the 1951 pack. It is my opinion that the set-aside procedure is the most equitable method of apportioning the military requirements across the canning industry.

There will be problems in securing 100 percent participation, and also when packs of individual packers do not come up to the desired grade. I feel certain, however, that with the experience gained in World War II, these problems can be solved. I want to assure you that so far as it is humanly possible, the program will be administered equitably and impartially.

My office is furnishing and will continue to furnish the food canning industry with the maximum possible advance notice of requirements so that industry may be fully advised of our needs and be able to make its plans to the best advantage.

I want to emphasize that the temporary relaxations of grades, can sizes, and packaging that have been permitted during the past six months

in order to obtain emergency needs with the least possible dislocation of the economy, cannot be continued in purchasing the armed forces requirements from the 1951 and later packs.

It is essential that the quality of the armed forces menus be restored as quickly as possible to the standards existing before the Korean campaign. The military supply systems cannot continue to be burdened with an excessive number of can sizes, particularly the small family-size cans which are not suitable for military use. The exigencies of overseas shipment and storage, multiple handlings, and storage under adverse conditions for extended periods of time require the protection of canned foods provided by the V2S box with sleeve and straps.

Particularly, I wish to urge a maximum production by industry of the No. 10 can for the armed forces to the extent that packing facilities exist for this size. I am not suggesting that items such as cream style corn, asparagus, figs, and grapefruit segments—where the necessary heat penetration may result in a mushy product—be packed in No. 10 cans. Nor do I recommend the conversion of packing lines to No. 10 cans where they are not now presently packed.

I do say, however, that the most suitable container for canned fruits, vegetables, and juices, for the armed forces, is the No. 10 can, and that we would like to have up to 75 percent of our requirements in this size. The larger tins mean fewer cans to open in the messes; they save space and weight in shipment; and they use less metal, tin plate, and fibreboard than an equivalent weight of the product in smaller-size cans.

The program which I have outlined is of such size and scope as to require the full support—and by full, I mean 100 percent support—of the canned food industry if we are to meet our objectives, which, as I have said before, means the proper feeding of the armed forces at home and overseas.

I cannot conclude without again expressing my appreciation for the cooperation which has always existed between my office and the food canning industry.

One needs but to turn to the supply figures of the past two wars to see how this great industry, in time of national emergency, proved itself equal to the enormous demands which were made upon it.

When I look upon this large assemblage, gathered to consider seriously what is expected of it in our present emergency, and how to meet the many problems that have been and will be placed upon it, I am certain that the genius and determination that has always characterized the people of this industry will surmount all obstacles. I know that my office and the armed forces can count on you to deliver the goods—100 percent.

THE CANNER'S ROLE IN ECONOMIC UTILIZATION OF THE NATION'S FOOD PRODUCING FACILITIES

By S. R. Smith, Chief,
Fruit and Vegetable Branch,
Production and Marketing
Administration, USDA

The title for my talk sounds a bit formidable, but, all things considered, the title is probably no more formidable than the job that has to be done, and will be done. Before I launch into any discussion of "The Canner's Role in Economic Utilization of the Nation's Food Producing Facilities," let me quote from Secretary Brannan's announcement of production guides, released on February 2 just past:

"The fact that there is a limit to the total crop acreage which is available means that production guides must be planned within a balanced schedule. Increases in some crops necessarily mean decreases in others. It is therefore not practicable to ask for as large an acreage in some instances as would otherwise be desirable. It would be a good thing, for instance, to have an even larger corn crop than we are suggesting, if it were not necessary to consider the need for other grains, soybeans, and other crops which compete for the same acreage.

"The production guides are designed to help farmers plan their crops in line with the over-all needs—turning out the highest possible balanced production this year, and at the same time protecting their resources for the future."

Now, it is within this broad framework that I want to discuss with you "The Canner's Role in Economic Utilization of the Nation's Food Producing Facilities." We know that the canner's operation starts on the farm where the raw product is produced. You know, from your study of recommended vegetable guides announced by the Department on February 7 that the theme of balanced production is being followed in your field.

I'm sure that you know how smoothly processing facilities must be geared to farm production if a good program is going to click. You know it and each year do something about it, or you wouldn't be able to remain in the canning business. The situation which confronts the canning industry today is not completely new; essentially it's the same situation you have to live with every year. In an emergency, such as the present one, the situation becomes aggravated and some call it a problem. But there are still enough familiar landmarks for you to chart your general course toward ultimate solution.

Before we look at our immediate situation, and before we attempt to

determine where we should be headed, it might be well to take a quick look over our shoulder. As fast as the world has moved in the last decade or so, we don't have to look back too far to recognize problems that seem to be coming at us again.

In April of 1941 the Department called for an increase of 15 million cases—an increase of 50 percent—in the pack of canned tomatoes to meet prospective lend-lease requirements. Then in December of 1941 we called for increased production for 1942, with pack goals of 40 million cases of canned tomatoes; 38 million cases of canned peas; 12½ million



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cases of canned snap beans; and 24 million cases of corn. As you will recall, these represented sharp increases for tomatoes and peas, kept snap beans at what was then a record peak and only slightly reduced corn below the then record 1941 pack. To encourage production, the Department offered to buy all supplies of tomatoes offered them at 95 cents per dozen No. 2's and all offerings of peas at \$1.10 per dozen No. 2's. Minimum grower prices of \$5 per ton over 1940 for tomatoes and \$17.50 per ton over 1940 for peas were announced at the same time. For tomatoes, such prices ranged from \$16.50 to \$22 per ton by states.

I know these prices don't sound very spectacular right now, but at the time they were announced they were unheard of. A lot of people thought the Department had gotten completely off the beam and was taking steps that could only be described

as radical. I must admit—and I was involved in these programs, too,—that I thought we in the Department were taking in quite a lot of territory and I gulped a little over the possibility of finding we were on the wrong track.

As it turned out, we were on the right road. Even though some of the prospective requirements on which the increases were based failed to materialize, others developed and packs of that magnitude and even larger were needed and the supplies we had came in mighty handy.

The big point I'd like to make as we look back at that period is that the canning industry came through with the expanded production when it was needed. And I know that what the canning industry has done in the past it can do in the future.

Canned foods are used by the military in large quantities—perhaps to a greater extent in relation to total supplies than any other group of products. This is due in part to their very nature and the ease with which they can be handled and transported. Canned foods started going in volume to the military in 1941 and 1942 and by 1944 had reached a really high level. In 1944 takings by the armed forces were more than one-half of the canned fruits; one-third of the canned vegetables; and one-quarter of the canned fruit juices. While part of these needs were met by an over-all reduction in civilian consumption, more of the needs were met through increased packs.

Because of the vitally important role that canned foods play in war and defense, your industry is one of the first to feel the impact of any situation such as that in which we find ourselves today. You feel a double barreled impact. In the first place, you are called on for increased production to meet essential civilian and military needs. But, on the other hand, restrictions and shortages make it more difficult for you to increase production. That is, at first blush, a mean predicament. And the trouble is, no matter how you study it, it continues to be a mean predicament.

As I get along here today, I will endeavor to outline for you the nature and extent of some of the things we in the Department of Agriculture are doing to help the canning industry with its 1951 production problems. This will take me into the field of grower prices and problem areas such as materials and facilities, tin, set-asides and labor needs. At least, I'm going to try to outline them as I see them. The process of outlining won't give you all the answers, I fully realize that, but I hope it will prove helpful. After all, the farmers of this country, and you canners, are the ones who have the actual production job to do—not the Department of Agriculture. Our job is merely to help—to help clear

the way for those of you who do the work and carry the responsibility.

On February 7, the Department announced its suggested acreage guides for vegetables for processing. These were developed, commodity by commodity, against background information that included the stock position of the industry, the military's estimates of their requirements, and our own best estimates of the potentially high civilian demand for your production. Against these factors we tried to match some of the limitations on increased production which you will undoubtedly face this year.

These include some limits on plant capacity and facilities, shortages and dislocations of your labor, replacement equipment, spare parts for machinery, and material supplies, including cans and cases; competition for land between these and other very important commodities; and the ever-present problem of an uneven flow of these commodities from the fields to the plants. We were mindful, also, of the importance of maintaining the high quality of your production.

Our suggestion that the acreage to be planted to these crops be increased 22 percent above the 1950 acreage should be looked upon as the minimum your markets will require of you after you have filled military needs. To meet this demand, growers and processors will need to see that the acreage is increased for lima beans at least 5 percent; snap beans 10 percent; peas 15 percent; tomatoes 35 percent; and sweet corn 40 percent. For beets, cabbage for kraut, cucumbers for pickles and spinach, no acreage change was suggested.

Each of you should appraise these recommendations in the light of the knowledge of his own situation. Tie into this program to the fullest extent possible, but only to the extent your facilities will permit you. Those of you who can increase more within the limits of your facilities are urged to do so.

On the same line, growers are being urged to plant only to the extent that processing outlet arrangements are assured, for production for processing—without processing outlets—is no production at all. So, if this tie-in objective is followed, a most important phase of the economic utilization of the nation's food producing facilities will be achieved.

With normal abandonment and average yields on the harvested acreage, we could expect a production increase of about 17 percent for 1951 from the suggested acreage. For the commodities included in the guides, and after an allowance for the freezing segments of the industry, it would mean a pack of about 220 million cases, basis 24/2's, compared with about 186 million cases in 1950. These, plus the packs of asparagus,

carrots, sweet potatoes, pumpkin and squash—not included in the acreage guides—would bring the total 1951 canned vegetable pack, excluding soups and canned dried beans and peas, to more than 240 million standard cases.

Again, on the basis of 24/2's, the suggested acreage means a pack of green and wax beans approximately 20 to 21 million cases, a corn pack of 30 million (about 34 million actual cases) and about 35 million cases of peas. It's hard to estimate the tomato pack out-turn, because it's complicated by assumptions you have to make on the proportion of the production to be used for canning peeled tomatoes, tomato juice and other tomato products. If the use out-turn is about the same as it has been during the last 5 years, there should be about 26 million cases of canned tomatoes, about 30 million cases of tomato juice and about 34 million cases of other tomato products.

Now, we would like to see a higher production of some items than these suggestions indicate. Important in this respect are corn, tomatoes, tomato products, peas and lima beans. But, again, this depends upon your individual situation. To go beyond the suggestions will depend upon your individual plant capacity and facilities; whether they will permit you to do more and still assure their economic utilization. I know that with some of you the answer will be in the affirmative. But it is a question each of you must answer for himself.

Let's look now to canned fruits and fruit juices. In this field we can't do anything about increasing plantings to achieve higher pack goals. Here we have to work toward the most efficient utilization of available supplies, knowing that growing conditions govern the amount of raw material that will be available.

The emphasis on utilization of fruits during an emergency period leans toward the processing outlet but not exclusively so. Again we must consider balance, balanced utilization as dictated by the relative importance of the needs.

There has been a steady and continuous growth in the processing of all fruits since World War I. At that time less than a third of the total deciduous fruit crop was processed, and only a negligible portion of the citrus crop. Contrast that to the last five years, during which more than half the deciduous fruit crop was processed, and almost half of the citrus crop. And bear in mind that these trends are accentuated during emergency periods, when the armed forces need so many canned fruits and fruit juices.

The immediate problem in the field of canned fruits and fruit juices is to provide the 1951 pack military requirements of nearly 10 million cases of canned fruits and more than 5 mil-

lion cases of canned fruit juices, and at the same time provide an orderly flow of the same commodities into commercial civilian channels.

As I said before, growing conditions will have a lot to do with solving this problem. If crops are abundant, not too much extra effort will be required. But if supplies are short, it may become necessary to invoke some of the types of controls used during World War II to channel supplies to needed processing outlets. On this, let me caution you fruit canners from assuming that such actions are a foregone conclusion just because their possible need has been mentioned.

Now I'm going to mention something that borders on the unpleasant. But it should be said out loud somewhere, and this is a good place for it. When there is a known substantial need for canned fruits, the canning industry is sometimes tempted to compete over-vigorously for fruit supplies. I don't need to tell you how many pitfalls lie along this route. There have been burned fingers in the past. I bring this up partly because some of the price levels at which fruits were purchased during the 1950 pack season, for example, have not gone entirely unnoticed. Another case in point is the behavior of prices of pears for canning from year to year. No one can guarantee to you that the Office of Price Stabilization will allow you to pass along to consumers the prices you may pay for your raw fruit if your bidding for it is undertaken with the enthusiasm that has sometimes been apparent in recent years.

During the last two seasons, the packs of canned fruits and canned fruit juices have each been about 70 million cases, on their appropriate can size basis. However, the requirements we see on the horizon, although substantially less than the peak of World War II, point clearly toward the need for a maximum canning effort, particularly for the canned fruits out of the 1951 crops.

In the case of canned fruit and fruit juice, as in the case of canned vegetables, I want to emphasize the need for consideration of the long haul as well as the short pull. Quality standards must be kept up. That's the foundation on which you've built a thriving industry. Don't weaken it now. Consumers may accept inferior quality during an emergency, but they will remember it, and not kindly, when the emergency is past. And every man in uniform is a potential future civilian consumer, too. I can't advise you too strongly to preserve the integrity of your products, to maintain the good consumer relationships you have built up over the years. Bad habits are hard to break.

How about some of the other problems, such as price?

The Defense Production Act provides, in part, that ceilings on agricultural commodities or products processed from agricultural commodities must not reflect less than certain levels—known as legal minimums—to the grower. These legal minimums, which are season average prices for the country as a whole, were announced by the Department on January 31. The legal minimum prices for most canning fruits and vegetables are at parity. Essentially, parity establishes a certain level of over-all agricultural prices and establishes the price relationships among commodities on the basis of average prices over the past 10 years. In relation to other agricultural prices, these legal minimums on canning crops appear generally adequate, though some may be a bit high and others a little low.

In order to have real meaning to you these over-all legal minimums must be broken down by area, grade, size, variety, and so on. However, the type of price breakdown actually needed for factors other than area is dependent upon the type of pricing undertaken for the canned product. We are working closely with officials of the Office of Price Stabilization on this problem. You fully realize the need for tying together raw and finished product prices. We are fully aware that this phase must be clarified at the earliest possible date and we are working hard to accomplish it.

Our work on materials requirements is just getting well under way. As you know, the Secretary of Agriculture has been delegated the responsibility to act as claimant before the National Production Authority for materials needed for the production, processing, and distribution of food. We have been doing preparatory work needed for effective claimant functions and for the adoption of a Controlled Materials Plan. The development of material requirements for the fresh and processed fruit and vegetable industry is a complex task because of the number of commodities and types of operations which are involved. This claimant function of ours provides another good illustration of the type of activity which will require close industry-government teamwork. We must continue to look to you people and your associations for much of our needed information. With your close cooperation and assistance, we hope to function efficiently in carrying out our responsibilities in this field.

Now, let's take up the subject of tin cans. As you know, the present regulation M-25 establishes maximum tin coating specifications and sets a limitation of 100 percent on the non-seasonal, nonperishable products, with perishable fruits and vegetables being in the unlimited category. I think you have been accorded some

definite recognition in this regulation because, for the first time, food products have been treated differently from nonfood items. The nonfood items have been limited to 90 percent of their 1950 tinplate used. No one knows exactly what will happen concerning tin supplies, or what further measures may be required in addition to the present 20 percent cutback under the basic tin order.

However, I do feel at the moment that we must have a clean slate in the food industry if we expect to retain the recognition we have been accorded. I do not believe that we can make a defensible case for the luxury and nonessential tinned food items when other important uses are being severely restricted. With your help, I hope we can work out some further reasonable and at the same time realistic conservation measures so that the food industry will be able to make the required or necessary contribution to the over-all tin conservation program.

At the same time we realize the present tin orders, beginning with M-8 and on up, present some real problems to the food processing industry. We are working on these with the National Production Authority. I am sure practical solutions will be forthcoming. They must be if the food production job is to be achieved.

Set-aside orders are another possible activity affecting your industry. We have excellent working relationships with the Quartermaster Corps, and you have been told here this afternoon about the procurement plans of the armed services. We have the question of a set-aside order on canned fruits and vegetables under study and will discuss the need and associated problems with the Fruit and Vegetable Canners' Industry Advisory Committee in the near future. (*Membership of this Committee is listed on page 126.*)

By relating the 1951 pack requirements announced by the QMC for individual items to the 1950 or 1949 packs, you get a fairly close approximation of what your contribution as an individual canner may be. You perhaps have noted that in the case of vegetables, the armed service 1951 requirements average a little over 12 percent of the 1950 pack, varying from a little over 3 percent for canned beets to almost 35 percent for canned lima beans. For canned fruit the average of 1950 packs is about 18 percent, but varying in magnitude item by item.

A set-aside order should not be looked upon as a restriction or regulation in the ordinary sense, but rather as an equitable way of distributing government requirements within the industry. It is thus a sharing of an industry responsibility. However, we also consider a set-aside order as a production incentive. An early determination in this field will

permit canners to plan their packs better, by advising them on what part of their production is to be reserved for government use.

Just a few days ago, the Department announced the appointment of a Fruit and Vegetable Canners' Industry Advisory Committee. Perhaps some of you are wondering why we aren't using the N.C.A. War Mobilization Committee as our advisory committee. Actually, a considerable number of the people involved are members of both committees. However, because of requirements of the Defense Production Act, we must have appropriate distribution by size and type of operation, geographic location, and include both association members and nonmembers. In view of this, it was not possible to use your Association committee in its entirety.

We plan to meet with the Advisory Committee from time to time and to lay our problems before industry representatives so that we can obtain their advice and recommendations. These meetings will also give industry representatives a chance to tell us their problems and discuss them with us. It is likely also that these committees will be consulted jointly by other agencies representing other phases of the defense effort.

Contributions of recommendations and information are a valuable aid to the nation in its effort to solve its most difficult problems by democratic means. These committees give very practical advice in the formulation and execution of defense programs, particularly those which involve regulations or orders. The teamwork of industry and government in this regard is most important to the welfare of our citizens and to the ultimate success of our nation in the present emergency.

In addition to the Advisory Committee, we plan to have working groups of industry representatives to devote their attention to the special commodity problems that will arise from time to time. And the problems of any one of you individually will be studied as they may come up. And to sum up on this point, let me add that we fully expect to use your Association's established committees freely. We've gotten a lot of help from them already.

We are completely aware that one of your most pressing problems is to be assured an adequate supply of labor. You must have competent in-plant labor to maintain a reasonable level of efficiency, and growers must have field labor available if they are to produce and deliver a dependable supply of raw products. Every effort must be exerted to follow the most equitable procedure possible in keeping local draft boards fully advised concerning the status of in-plant employees who may be subject to call. Similar consideration

must be given the employees needed in the production and harvesting of raw products. In order that we in the Department may properly discharge our responsibilities as claimant, we must have current and correct information covering the conditions that develop from day to day in this phase of operations. The more advance information we can obtain, the more we can help you.

We are arranging now to secure the services of a labor specialist who has had extensive training and wide experience in this field to assist us in working with you in such a manner that all agencies involved will secure the most accurate information possible.

Up to the present time we have received and acted upon several canners' applications for certificates for special tax amortization of the cost of plant expansion to meet defense needs.

We regard the small number of applications as a good omen—an encouraging indication that the fruit and vegetable canning industry, generally speaking, is strong and healthy and, more important, willing to share on its own, to the maximum extent of its ability, the job of food production. Also, I believe the small number of applications may indicate that most canners believe their current expansion will be useful and profitable to them after the emergency is over.

No doubt one of the major questions is "What percentage of the cost of a new or expanded plant might be certified under a Necessity Certificate?" There is no hard and fast rule that can be used to answer this question. However, all of you are probably familiar with the regulations published by the National Security Resources Board and you may have seen the report form which referral agencies must use in making recommendations. If you will study these two documents carefully, you will obtain a rather definite idea of the standards used to determine the portion, if any, which would be certified. Within these standards, we are considering each case on its own merits and are gradually developing a pattern which we believe will be realistic and consistent.

Therefore, since the portion to be certified is dependent upon contribution to the national defense, economic usefulness after the emergency, and other factors given in the standards, the determination must be made for each individual case and no general statement can be given.

I've touched upon quite a number of subjects—too many to give very much detail. Moreover, I do want to emphasize that some of us in the Department have worked with industry groups long enough to fully realize that in this instance I have not given you anywhere near all the informa-

tion you want and need. You men like it in a one, two, three fashion. I like to give it that way also. Time is short, making it doubly important that you get the one, two, three without delay. I assure you that the Department of Agriculture is sparing no facility, time, or energy to discharge its responsibility on this whole front.

The spectacular and steady growth in the production and consumption of canned foods over the last 40 years is clear evidence of their essentiality in the American pattern of living. This growth has been achieved only because you in the industry have provided the American people with constantly improved products at acceptable prices. They are a true part of the American way of living which we are always fussing about, and currently again protecting.

It seems to me the job to be done in food production by your industry is very clear. There is little reason on your part to resort to the currently common escape avenue of crying "confusion." All of us like to have a maximum amount of information that we can count on as being certain, but,

being human, even when we get to that stage most of us still aren't completely satisfied.

We in the Department, in the light of past performance by the canning industry, simply assume that you people will put on a "repeat performance" of your World War II contribution in this present emergency. In fact, we are confident that you will top that performance by so much that your World War II records will fade away into the background. Our confidence is based on the fact that the canning industry has never looked upon any record it has set as something upon which it could rest, but rather as a challenge to do an even greater job.

You have a great job to do now. We in government are going to do our best to help you do that job. Whether the help you get from the government agencies with whom you deal will always prove to be timely and positive, I can't absolutely guarantee you. I can guarantee you that our effort will be there, and that your effort and our effort combined will get this job done, and get it done well.

RAW MATERIALS, CONTAINERS AND CONTROLS OUTLOOK

By Charles A. Lewis, Acting
Director, Container Division,
National Production Authority

Mr. Taylor and ladies and gentlemen and fellow speakers: I first want to thank you for the honor of being introduced to the National Canners group. I did not come here to make a speech. I think the National Production Authority will be very ably represented in that respect by Robert J. Small of our Containers and Packaging Division, who is going to talk on Order M-25. I am probably the only speaker here today who came on such short notice from Washington that there was no opportunity to prepare a speech, so I am going to talk off the cuff. Although I realize that is one of the quickest ways for a government official to get his neck chopped off, nevertheless, I am going to try to cover a few points that I think should be brought out here. I will try to make them brief.

My express purpose in coming here was mainly to have the opportunity of meeting with you as a group so that you would come to know me and I would come to know you better—so that I would have the opportunity during the next three days of meeting as many of you individually as it is possible—because I am of the firm conviction that every government representative and every industry representative should avail themselves of every opportunity that presents itself during the present emergency of getting together, coming to know one

another's problems better, and exchanging ideas, exchanging thinking. I believe that if we do that sincerely and earnestly, we will make a great deal of progress and that we will be able to move toward our goals and our objectives a great deal faster and with less disruption.

When I walked into the Stevens Hotel this morning, in the offices of the National Canners Convention, I was handed a good deal of literature. One of these papers was entitled "Background Statement on N.C.A. Convention and Canning Industry Public Service." I began to glance through that document, a very enlightening document, and this is what I began to see:

That the average annual pack of canned foods is about 560 million cases or approximately 16.9 billion cans. Seasonal vegetables, 185 million cases or 4.4 billion cans; fruit, 75 million cases or 1.8 billion cans.

Well, I immediately realized that I was traveling in pretty high company here today because down in Washington we don't often deal in such astronomical figures. . . . It reminded me of a story that I think brings out a point I would like to get across here today.

Down in Washington we are great football fans and we have a football team called the Washington Redskins of which we have been pretty proud. But this year we had a pretty tough season. The team got beaten up pretty badly. After one particular game in Griffith Stadium, I think the Redskins

had just played the Browns and emerged pretty badly battered, some of the football players on the Redskins team were sitting on the bench in the clubhouse and wondering how they ever came to get into such a bruising racket.

One of them said, "I am a Yale man, and when I think of how I got into this pro football racket! I got into it by running into a very tough subject—a thing called trigonometry. Boy, is that subject tough! Net result—I flunked out and became a pro football player."

Another fellow said, "I am from Michigan U. I had a similar experience, but you didn't run into anything really tough! I ran into calculus up there and, brother, that's really tough!"

About that time a voice came from way down at the foot of the bench. This voice said, "I am a Notre Dame man myself, and if you fellows think you ran into anything tough, did you ever take simple arithmetic?"

Well, gentlemen, here is the kind of simple arithmetic that I am running into when you are talking millions of cases of this or that. We are talking mere tons, tons of tin. We are trying to see how we can take one ton of tin this year and do what two tons did last year. We are trying to see how we can take one ton of tin coming into the country this year and make it do what five tons coming in last year did. So, brother, I can sympathize with that Notre Dame man because this kind of simple arithmetic is tough!

Actually, this nation is in a period of very serious raw material shortages. We are in a period when there simply is not a large enough supply of our basic raw materials to meet both our defense needs and normal civilian demand. Accordingly, the National Production Authority has for the past several months been diverting and redirecting an increasingly large portion of the supply of basic raw materials that might normally go into civilian production into defense channels.

In doing this, the NPA has already written over 40 orders and regulations. Three of these orders and regulations originated in the Containers and Packaging Division of which I am the Acting Director. Two of the orders—Order M-25 on metal cans, about which Mr. Small is going to speak later, and Order M-26, the tinplate closures order—directly affect you people. Other orders, like M-7 on aluminum and M-8 on tin, indirectly affect you, and I would be less than frank with you if I were to say that you don't face increasingly stringent controls during the balance of 1951.

We are right now in the National Production Authority, shooting at July 1 as the target date to initiate, once again, the Controlled Materials

Plan. The Controlled Materials Plan, as you may recall, was the final workable answer to our basic materials controls on steel, aluminum and copper, during the last war. It is a plan whereby you write checks against an account, and you make those checks good. You do that because you are programming. You are programming your critical materials, and the output of many of the end products which use those critical materials.

When you program critical materials, and you set up a specific budget of steel, for example, you have to keep that budget and that program in line so that your tickets will be good. To do this, it naturally follows that you have to issue some specific Limitation



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(L) and Materials Conservation (M) orders to bring and keep that budget of materials in line. You also have to issue some attendant regulations of a general nature, such as the old MRO Order that went with CMP during World War II and which will be issued once again very shortly. I know that that particular order is one that you gentlemen will be happy to see issued because it will help you get your maintenance repair and operating supplies.

We have one general objective or policy in the Containers and Packaging Division of NPA and that is to supply containers for all products to the extent that we are able to do so dependent upon the supply of basic raw materials. This objective or policy has three ramifications, or I might say qualifications: First, to ascertain that our defense effort gets all of the containers and packaging that it needs. Secondly, that all of the more

essential civilian production that is needed to keep our domestic economy strong gets the containers and packaging it needs. An example in this second class would probably be your perishable food pack and the pack of your staple foods. Lastly, to the extent that we are able to do so after the first two objectives have been achieved, to see that all other products regardless of essentiality get a package or a container of some type as long as such products are permitted to be manufactured.

We in the Containers and Packaging Division believe that in 1951, during the balance of this year, we will be able to provide manufacturers of all products some type of a container. It may not be the one they have normally used. It may be a substitute, or interchangeable type of container they would rather not use. In some instances, they may have to reuse certain types of containers. But with the cooperation of industry, and with the realization of members of industry that we are really in a pretty tough materials situation at the present time, I believe that we can stretch our raw material supplies so that all container and packaging needs will be taken care of during 1951. Some type of package should be available.

I want to assure you that we realize that a control like M-25, for example, is not the answer to the present situation on a long-term basis, is not the answer you want, nor is it the answer government wants. Realizing this, the National Production Authority has what might be called an overriding policy, or a policy which almost overrides everything else. That policy is to carry forward expansion programs in our fields of basic raw materials, such as steel, aluminum, etc. We feel that on a short-term basis we can probably relieve any given situation through orders such as M-25, can bring a particular program into balance; but on a long-term basis, we feel the only answer is to step up the production of steel and the other basic raw materials that are needed so that two or three years hence we can take care of our defense program and at the same time handle an unlimited civilian demand. So, on a long-term basis, we believe that these expansion programs are the real answer, and we are working night and day to get them going. In '52 and '53, in many areas we will begin to work out of this control business.

As I said, I did not come here with any prepared talk but mainly to tell you that Bob Small and myself will be down here through Monday to meet with as many of you as we can individually, so that we can exchange ideas and learn your thinking. I believe to the extent that we are able to do that you will have more confidence in us, and we will have more confidence in approaching your problems.

METAL CAN CONSERVATION

By Robert J. Small, Chief,
Metal Can Unit, Container Div.,
National Production Authority

In the event that some of those present may not understand the causes for the present conservation measures under which you are now working, I should like to outline briefly what has taken place during the last year. May 1, therefore, digress from cans for the moment.

From the middle of 1949, at which time Order M-43 (old WPB tin order) was drastically relaxed, tin was entering the country at a rate sufficient for our industrial and defense needs and at a price of \$1.03 per pound. During the latter part of 1949 and the first half of 1950 the price declined to the level of 72 cents to 75 cents per pound, with the receipts into the country holding its own. After June, 1950, the price began to rise and reached a figure of \$1.55 in the fall of 1950, at which time a great many of those buying and using tin began to shy away from buying at that high-level and used from inventory to the fullest extent possible with the hopes that the price would decrease.

Contrary to decreasing, the price has steadily increased, and in 1951 the rate of receipts of tin in the United States are very much less than the rate at which it has arrived in the past several years.

Faced with a dwindling tin inventory and a decline in receipts, it has become necessary for our government to take some action to assure necessary amounts of tin.

The logical approach to this problem seemed to be to reduce the consumption of tin by all tin consuming industries and to increase the rate for increasing defense purposes. The steps taken to date to accomplish this have been:

The issuance of Order M-8 reducing the consumption of tin and M-25, which established can specifications for all products as well as limits on the quantity of some food products and all nonfood products that may be packed.

You are the industry group, after all, that I, as Administrator of the National Production Authority's Can Order, M-25, will have to work with for the duration of the present national emergency. You are the ones who are going to have to work together with me in the administration of this Order, M-25, if the order is going to do the job that has to be done in the days that lie ahead. That job, gentlemen, believe me, will be a tough one. Specifically, it is just this:

To see that every product that requires a metal can made in whole, or

in part, from tinplate or terneplate, gets a metal can in the face of a diminishing tin supply.

That basic objective has some qualifying factors that make its implementation even more difficult. First, we have a more or less moral obligation to see that our perishable food pack receives a right-of-way to whatever existent supply of metal cans there is. That in itself will be far from easy in view of the fact that there is always a need for increased food production during an emergency such as the one we now find ourselves in. If we are to mobilize all of our natural resources, all of our great



ROBERT J. SMALL

productive might, food production also must be mobilized, must be increased. To the extent that this increased food production must find a home in some type of container, certainly some share of it will be translated into an increased demand for metal cans. And, in all probability, a considerable portion of such an increase will be found to fall among the "perishable pack" items. These items take the heaviest toll of the tin that finds its way into tinplate.

Another qualifying factor that makes the job to be done increasingly tough is the growing impact of special cans for the military. Ration cans are a good example. These all take tin.

Then there are many staple food items, including meats, for which there is already a rising demand. These take tin. Neither can the nonfood can area be ignored. Here the utility of the tin used in can manufacture might be honestly said to be even greater than in the area of food

cans. Certainly no one can deny that there are many very essential nonfood products without which our economy would soon be in serious difficulty. Due to the chemical composition of many of these important nonfood products, the cans in which they are packed must have tin coatings.

And tin, as I have previously indicated, is in very tight supply. Unlike steel, and aluminum, and other metals presently in tight supply, tin production cannot be increased at least, within these United States. Tin is unique in that every single ton of it is produced outside the United States and must be competed for on the world market by this country. In the face of the extremely uncertain international situation, therefore, we have no assurances as to future supply. Were tin supplies ample, it is perfectly obvious there would be no metal can order, such as the present M-25, on the books.

As yet, we don't know what effect any additional tin cut will have on 1951 can production. Whether further reductions in plate specifications can be made has not yet been determined. Just as a matter of information, I might say at this time there is some need for adjustments in the present plate specifications of M-25. There also is hope, although it will not be forthcoming in the immediate future, in new plating processes. Some rolling mills indicate that they may soon be able to coat tinplate lighter on one side than on the other, to the end that considerable economies in tin are possible. In other words, the future is not without hope, but even on a long term basis has its encouraging aspects.

I am of the firm conviction that while the job that lies ahead is a really tough one, that it is one that can be done, can be surmounted—and successfully. Certainly, we in government cannot do the job alone. Neither can you in industry do the job alone. We can only do it together, working toward mutual objectives. As Administrator of the metal can order, M-25, I can accomplish its objectives, and at the same time serve you better, if I have your continued assistance, your continued understanding, your thinking, the benefit of your know-how, and last, but not least, your encouragement. No one likes controls—I no more than you—and you may rest assured that because of this we will have them with us no longer than they are absolutely necessary to meet our defense needs.

Now, before I close, I want to say, in the event that some of you have not been advised, I will be here at the Canners Convention through Monday to meet with as many of you individually as that time will allow. At such individual meetings I will try to answer as many questions on M-25 and its relation to your business as you may wish to raise.

MANPOWER AND NATIONAL SECURITY

By Robert C. Goodwin,
Office of Defense Manpower,
U. S. Department of Labor

I welcome this opportunity to meet with the membership of the National Cannery Association and to discuss with you some of the major manpower problems which your industry as well as all industry and agriculture will face this year as the defense program gathers momentum and climbs into high gear.

Meetings such as this with the opportunities they afford for mutual exchange of information facilitate the type of cooperation and understanding between government, labor and management which is so essential to the solution of our common problems.

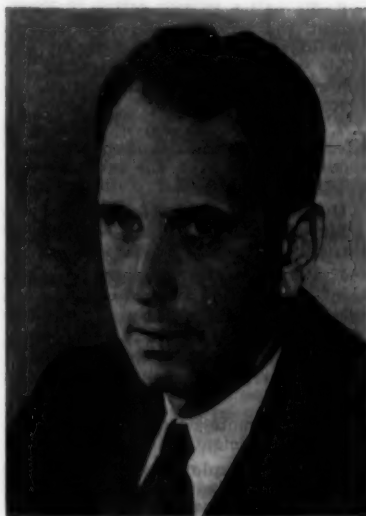
I hope that during your sessions we in the Department of Labor can contribute to your understanding of the magnitude of the expanded defense program, the scope of the programs established to meet our manpower problems and the steps we have taken or are taking to discharge effectively the Department's responsibilities for meeting the manpower needs of defense industry, government defense installations, agriculture, and essential civilian employment. I am sure you will not hesitate to give us all the facts you have on your manpower problems as well as your suggestions for joint cooperation to solve them.

At the outset let me say that while no serious manpower shortages have developed so far, serious manpower problems do lie ahead. The principal reason no serious manpower problems have arisen is due to the fact that we have been going through the "getting ready" stage for mass production of munitions and military equipment and up to the first of the year few firms were ready for mass hiring. It has been a time of scheduling defense contracts, a period of planning, of policy-making, and of organization for the job ahead.

We are on the threshold of a sharp expansion in manpower demands for defense. Our best information from the Department of Defense points toward swift expansion of military production and greatly increased deliveries of hard goods. Agriculture and food processing are girded for a record production to meet expanded crop goals. Government is speeding its expansion of personnel needed in the defense effort. All of this spells out a big need for more manpower for defense. By midyear the needs of the armed forces for men and materials will require continuous expansion of the total labor supply and the best possible utilization of available labor supply. Many workers will have to be diverted from normal civilian production in the months ahead especially during the last half of the year when

the full impact of the defense program hits the economy.

As usually happens in a national emergency, agriculture is the first industry to feel the manpower pinch. As a matter of fact, there would be a serious labor shortage right now if agriculture were not in the "off season." As defense industry expands, more and more workers normally available for seasonal jobs in agriculture or food processing will take jobs in year-round activities paying attractive wages. The stream of migrants upon which agriculture normally depends for supplemental labor supplies will diminish. All this will



ROBERT C. GOODWIN

happen at a time when agricultural labor needs will be higher than in recent years because of increased production goals.

While we are confident that manpower problems can be met, I would be overly optimistic if I did not tell you that many of the problems we face will be extremely difficult of solution. Success or failure will depend not only upon decisions and actions of people like yourselves throughout the country but upon intelligent and prompt community actions in the localities where they develop. Essential also will be cooperation by all government departments and agencies to assure that defense contracts and other programs which increase manpower requirements in a community are placed in such a way that maximum utilization of available labor supplies is effected.

At the time of the invasion of South Korea, the civilian economy was operating at close to capacity levels. In the period since that time we have entered upon a vast program of de-

fense mobilization and the economy has experienced record levels of production and employment. However, this expansion has been primarily due to stepped up demand for civilian goods and services.

We are only in the initial stages of the defense effort as far as labor market activities and employment increases are concerned. In the six months between June, 1950, and December, 1950, the number of workers employed in manufacturing increased by one million. Only 300,000 of this number, however, were in defense production.

The President has indicated that during the 12 months of the calendar year 4,000,000 workers will be added to defense employment. A further expansion, at a much slower rate, may be expected in the first six months of 1952.

As you can see, we have entered upon a tremendous defense program. Our objectives are to build up our armed forces and production strength as rapidly as possible to meet the needs of the current situation and the situation ahead as far as we can see it. Our aim is to lay a defense production base, through wide distribution of contracts throughout the nation, broad enough to facilitate quick expansion to all-out production in event of total mobilization. In other words, we are building to meet the current situation and so planning our activities that we can jump to all-out defense production almost at a moment's notice.

In achieving these objectives, the aim is to build as much of the defense program on top of our existing strong civilian production economy as is practicable and feasible. A strong civilian economy is a must if we are to be geared for an all-out effort. We must bear in mind also that what we are now engaged upon is not total mobilization. Our defense effort is assuming tremendous proportions but it is still a partial mobilization. Our defense program is geared to the long-term implications of international tension. This means our mobilization programs must be flexible—adequate for the present and the near future—while gathering resources for possible requirements of the next eight or ten years. It is a program that has been forced upon us. It is a situation we must live with. We want to make it, so far as we can, a program we can live with.

To accomplish these objectives, total expenditures of \$17½ billion in the 1950 fiscal year have expanded into more than \$28 billion in fiscal year 1951 and to more than \$50 billion in fiscal year 1952. These are actual payments, but the amount of money which can be obligated over this period, to be paid when deliveries are due, is considerably larger.

The prospective need for an additional 4,000,000 workers in defense

activities this year, together with the scheduled withdrawal of over 1,000,000 young men from civilian life into the armed forces, comes at a time when our labor force is already practically fully employed. Currently there are 61½ million men and women in the civilian labor force of which about 2½ million are unemployed. Non-agricultural employment is at an all-time high. Agricultural employment is at its winter low but will rise seasonally by midsummer by approximately 3,000,000.

When agriculture is at its mid-summer peak and defense employment has absorbed another 2,000,000 workers, the civilian labor force will move up to around 64½ million. This figure does not include the armed forces which are scheduled to attain a level of around 3½ million by June 30.

This means the period ahead will be one of intense activity and great change in the nation's metropolitan labor markets. Millions of men and women will change jobs over the next 18 months. Some will be entering defense industry or the armed forces and others will be recruited as replacements. At least a million and a half and probably 2,000,000 persons are expected to enter the labor market this year in response to the demands for additional workers. As defense industry begins mass hiring, intensive recruitment drives will be conducted in many areas. Training programs will expand and greatly increased use will be made of women, the handicapped and older workers, especially in areas of scarce labor supply. We are likely to have rather severe labor shortages in some local labor markets. Occupational shortages which have been increasing will broaden and intensify.

Although it seems to be a paradox, we can't drop completely our worries about unemployment in the months ahead. Curtailment of materials needed in defense production has resulted in some layoffs and more are in prospect. The seriousness of the unemployment situation which may develop over the next few months will depend in great part upon the speed with which defense contracts are let in areas affected by materials cut-backs and defense contractors go into mass production. Efforts are being made to speed placement of contracts in areas where substantial numbers are being laid off in order to absorb these workers as promptly as possible.

The workers needed for defense activities will come in part from those presently unemployed, from the ranks of workers laid off by materials cut-backs and from recruitment of women, handicapped workers, and older workers not now in the labor force.

Our manpower programs and policies have been molded against this background. They are based on the

hard facts of the international situation and the programs established to cope with it. They are geared to do these things:

1. To add at least 4,000,000 workers to defense employment this year.
2. To increase the total labor force by approximately 2,000,000 persons.
3. To make the most efficient use of the nation's manpower.
4. To staff promptly the manpower requirements of defense production, essential civilian employment, government installations, and agriculture.
5. To aid each individual to serve in the capacity in which he can contribute most to the mobilization program.
6. To enlist to the fullest possible extent the support and resourcefulness of individuals, management and labor and local communities in the achievement of our mobilization efforts.
7. To conserve scarce skills and effect the best possible distribution of these skills between the military and defense and essential civilian use.

Our programs are designed to achieve these objectives voluntarily through such measures as:

1. Providing appropriate employment information to guide workers to jobs in which they can make their maximum contribution.
2. Develop recruitment and rehabilitation activities needed to expand the labor force.
3. To promote needed training and to provide efficient placement services.
4. Assist employers in promoting maximum utilization of the labor force, including women, the physically handicapped, older workers and minority groups.
5. To provide employers and government departments and agencies with labor market information, especially data on where labor supply is available and where areas are tight so as to promote the placement of contracts in areas which will result in the best utilization of our limited labor supply.

6. To assist workers to arrange for their transfer to essential jobs where the need exists.

The national manpower mobilization policy established by the President provides for government manpower controls only when and only to the extent needed to assure successful execution of the mobilization program. Such controls would include restriction of indiscriminate job shopping, use of employment ceilings, the control of employer hiring and the enforcement of manpower utilization standards, including the full use of women, handicapped workers and minority groups. It is not anticipated that these types of controls will be needed this year. The timing will depend upon how

tough the manpower situation gets and almost certainly these controls will emerge first in specific areas after such action has been recommended by management and labor committees.

Manpower problems develop on a local community basis and, in large part, must be solved by local action.

We have also arranged for the establishment of area management-labor committees with agricultural representation in all areas with manpower problems or which anticipate such problems. These committees will tackle local problems and advise local manpower officials regarding their solution. They will also aid in obtaining necessary community understanding and support.

The importance of achieving a balanced geographical distribution of defense contracts and other programs which increase manpower requirements cannot be overestimated. Failure to achieve such a balance in World War II resulted in much unnecessary over-crowding of contracts in many areas with consequent housing, sanitation, and other community problems.

All federal departments and agencies concerned with defense manpower have agreed to give full consideration to the availability of labor supply in placing new defense procurement contracts and facilities. This means that before a new contract is placed, the department or agency letting it will take a look at the manpower supply situation in the area under consideration. If it is found that the area facilities are fully used and that placing the contract there will result in over-crowding, cause community problems and possibly impede defense production, full consideration will be given to placing the new activity in an area where manpower is available.

In order to facilitate a better distribution of contracts and facilities, the Bureau of Employment Security is increasing the number of areas for which labor market reports are received. These areas will be classified to reflect adequacy of labor supply. In addition to the weighing of labor supply in the allocation of contracts and subcontracts, area classifications also will be used to facilitate the Department's recommendations to other agencies for needed program action to alleviate community problems which almost invariably accompany labor shortages. The classification will serve to identify areas in which there is a need for additional housing where in-migration is unavoidable.

The Department also has participated in the development of sound deferment policies to assure that both the armed forces and defense industry have the necessary skills. The Department maintains a list of critical occupations to guide the Defense Department in calling reservists and national guardsmen and to guide Selective Service Boards. The De-

partment of Commerce also has developed a list of essential activities.

Training of war workers was a major activity in World War II. A substantial amount of training will be needed this time to fit new entrants into the labor force for defense jobs and to train workers transferring into defense or essential industries. The Labor Department's Bureau of Apprenticeship is advancing a program for expanding its activities and for improving skills of workers on the job. The Bureau of Employment Security, Apprenticeship, and the Office of Education of the Federal Security Agency are developing plans, programs and policies for expanding and accelerating training activities.

In order to provide additional sources of agricultural and food processing labor to supplement the domestic resources, several steps have been taken to improve the arrangements for securing off-shore domestic workers and foreign workers.

Our government also has had further discussions with Mexico in connection with our international agreement for bringing in agricultural workers to supplement domestic labor supplies. A recruiting center in Hermosillo will be opened in late February to take care of the spring agricultural requirements of the far west. The final arrangements for a new agreement when the current one expires on June 30 will depend upon legislation we are preparing for submission to Congress to facilitate the bringing in of foreign labor during the defense emergency. It is the opinion of Mexican officials that better arrangements could be effected if the contracts were between the United States government and the Mexican workers rather than between Mexican workers and American employers. Under such an arrangement this government would subcontract the Mexican workers to agricultural employers in this country.

In the conference in Mexico City the Mexican government made numerous complaints about the number of violations of the individual work contracts, between Mexican citizens and American employers. The nature of these complaints were generally covered under the subjects of contracting in bad faith for a period of time for which the employer knew he would not have sufficient work; failure to pay Mexican workers the prevailing wage rates throughout the season; and complaints about inadequate housing. In light of the objective evidence submitted to us, we were forced to admit that some undesirable practices existed during the past season. The United States Employment Service will take every possible step to assure that the individual contracts and the international agreement are lived up to by United States employers this coming season. We know we can count on responsible employers to

lend their cooperation in carrying out the conditions of their contracts. Some of our most effective enforcement action has been the action of associations in disciplining members who violate their contracts.

Since the problem of agricultural labor is a problem of interest to you as processors, I want to ask you to use your influence with associations, and with individual farmers, to get them to recognize and carry out the responsibility they have and we have to Mexican citizens who come here to work. Public opinion in your community may be a much more effective force than police action. We should not permit a few individuals to place in jeopardy a program of great benefit to so many people.

We recognize that the farm labor problem will be more difficult this year than last and that substantially more foreign workers will be needed than last year. I assure you that the Labor Department will give the farm

labor supply problem prime consideration. The local employment offices of the public employment service will give you people in food processing and all farmers and growers all the help they can. We are making local labor demand and supply surveys. We are checking up on all available domestic farm labor sources. We will conduct intensive recruitment as needed. We will use our farm labor clearance system to bring in workers from other areas.

Let me say in closing that I have attempted to discuss both what is happening manpowerwise in the whole economy as well as in your own industry because these are interrelated. I know from past experience that your industry can be counted upon for wholehearted cooperation. You can be assured that the Department, the United States Employment Service and the state employment services are alert to your problem and are eager to cooperate with you in every way.

PRICE CONTROL AS I SEE IT

By Michael V. DiSalle,
Director of Price Stabilization,
Economic Stabilization Agency

Thank you, Mr. Chairman; thank you, ladies and gentlemen, for inviting me. I understand that in addition to those who are here we have an unseen audience alongside, and I certainly hope that you people who get a chance to see me will tell those people that there really isn't anything to be frightened about in spite of that picture that appeared in *Life*.

The Chairman said that Toledo is debt-free and I don't want you to get the idea that just because I am in Washington we are going to be out of debt down there. There are some things that just are impossible of accomplishment.

Somebody asked me when I was back in Toledo last week what I thought about Washington. I said, "It's swell, but I don't think the country can stand two of them."

You have been sitting here a long time listening to speeches and to constructive advice. There isn't too much that I can add; in fact, I have reached the point after three days—yesterday in Des Moines and this afternoon with the wholesale grocers and talking to various newspaper people, television people, radio people—where I am almost tired of listening to myself, and so I am going to let you off easy. I had scheduled an hour-and-a-half talk, but since I have been here one hour and 35 minutes in the back of the room—it took me 10 minutes to come over—one hour and 45 minutes—and since 5 minutes of my talk have been taken up by some other things, I think I can confine my remarks here to just 10 minutes.



MICHAEL V. DI SALLE

I don't have to tell you that there is a "freeze" on. I guess you know it. I don't have to tell you about the importance of food in the national economy. If you don't think it is important, you would not be in the business. So we can skip over those two items. I do want to talk to you briefly about what we are attempting to do.

There has been some question about rollbacks and reduction of prices. There is a possibility that there may be a reduction in some prices, there may be some rollbacks, but I am not holding that out as a promise to the consumer because I realize that there

are certain situations that have taken place in the economy that not being a magician I just could not restore. It is our hope that sometime by midsummer we will be able to restore in some measure on some kind of a plateau the reasonable relationship that existed between prices and consumers buying power prior to Korea. It does not necessarily mean that we are going to be able to get prices back to what they were before Korea, nor do I think by any stretch of the imagination that we can expect 1951 wages to pay 1936 prices. It is something that isn't being done in spite of the fact that my wife is most insistent that something be done about prices.

Incidentally, she does quite a bit of canning of seasonable products herself. I have been against it because I usually find out that by the time she gets through buying sugar and fruit and the vegetables that she wants to can and the jars and rubbers and what it does to her natural good humor after a day of canning, we are money ahead if we just buy the stuff that you fellows prepare. I am all for it. I don't want to see you go out of business.

Another thing, I don't think that one of our objectives is the liquidation of businesses. We are in Washington to maintain business and to maintain the relationship that business has always had in our national economy. There may be some business people who will be liquidated, but if they are it is because of some action they have taken themselves, not because of any action we take. We are not there to destroy the free enterprise system. We are there to attempt to make it work. We are there to try to preserve it in the best manner possible.

In connection with food, I wanted to say briefly a few words about parity. Not that I understand parity. I am not expected to understand it. I know what a refrigerator does, but how it does it I just don't know. I know what parity does. We have one fellow up in Agriculture; he is the only one who understands it. I haven't had a chance to talk with him yet in the 60 days I have been down there.

Yesterday at the Farm Institute I talked about parity. Before I went up there I debated a long time about preparing a 50-minute speech and not mentioning parity at all. Then I found it would be almost impossible, so I talked about it and I don't mind telling you the same thing that I told them.

We are attempting to live with the Defense Production Act of 1950 as it was written by Congress, and we are going to attempt to live with it. I think we need more experience with the Act before we are in a position to make recommendations to Congress as to whether the Act will operate or not. As I told the Farm Institute yesterday and I want to tell you people the same thing, if we find that

parity or any escalation principles that we have been talking about interfere with economic stabilization, then we are going to have to be forced into making a recommendation about modification of those principles. And that applies to parity as well as to some of the other items provided in the Act.

I hope that American business and American farmers and American consumers understand the relationship that each has to the other. There is so much talk about blaming the farmer for high prices or blaming the food processor for high prices or blaming the retailer for high prices, and maybe since the complaint is directed against each other, there might be some element of truth applied to each one of the segments. But that isn't our job. Our job is not to fix blames. Our job is to fix prices, and we are going to attempt to do it in as reasonable a manner as possible by attempting to maintain every element of reasonableness and justice that can be maintained in what is necessarily a wartime economy.

You fellows in business realize that even in ordinary peacetime in operating your own individual business you have problems. You multiply those problems by the 3,000,000 businesses that exist in the country today and you realize what our problems are, especially since the peacetime problems are complicated by the impact that has occurred since Korea, and the further impact caused by the intervention of the Chinese Communists in Korea. When you try to make an adjustment involving 3,000,000 business people handling over 8,000,000 products for 152,000,000 Americans, it isn't a problem that can be solved overnight. We used to do a lot of things in Toledo and I think we did them pretty well, but this is one of those things that is going to take time, it is going to take patience, it is going to take understanding on the part of everyone involved.

We hear a lot about incentives—that we must maintain incentives in order to maintain production—but I think all of us are going to have to reexamine the situation just a little closer and to provide some additional incentives; the incentives that we all have for self-preservation, for the preservation of the nation and for the preservation of a free world. Those are major incentives that we all have to keep before us every day that we go off to work.

Living in a democracy is not an easy task. A democracy requires some very painstaking care on the part of all of us to maintain the freedoms that we have labored over and preserved for so many years and we can't take a chance on losing those freedoms. We are not going to, providing we have your help.

I wanted to say something that I mentioned earlier in the day about enforcement. I think that our pro-

gram cannot live without proper enforcement. When I talk about proper enforcement, I don't mean the kind of a "busy body" enforcement that goes in and makes things tough for people who are in business but the kind of aggressive enforcement that goes out and searches out the people who are making it difficult for our program to operate; those people who are making unconscionable profits at the expense of the American people; those kind of people that are taking care of themselves without taking into consideration the sacrifices that are being made on the battle fields of Korea and the sacrifices that are being made by the parents of those boys that are over there.

I just can't understand such tactics on the part of any decent American. He can't be a decent American if he is taking advantage of a situation of that kind. So, if he isn't a decent American, certainly there is no reason for us to have any patience with him, there is no reason for us to have any tolerance for him, there is no reason why we should be lenient. As I said earlier today over at the grocers meeting, there is no "fix" in a situation of that kind. No one who does a thing like that will know anyone who will be able to help him, because our policy is going to be firm, it is going to be forceful, it is going to be strong, and those people are going to be gotten out of the way regardless of how long we have to pursue them in order to achieve that end. I think we owe it to the decent, legitimate businessmen who are attempting to live by our regulations to see to it that some people do not profit at their expense.

We have had a very happy situation in the past 60 days. We have had a situation whereby we have had all kinds of offers of assistance from American business, and we are accepting those offers. We are attempting to get the best men we can to come in and man our commodity divisions. Many of you know Ed Phelps, assistant director of the Commodity Division. A good many of you know Jack Hudson who is now heading our Food Division. We got those people because we felt they could do the job and for no other reason. They are under no control of any kind. Their only obligation is to do the best kind of a job that can be done in order to make the whole program operate within a framework that I have previously outlined for you. We are soliciting that kind of cooperation. It isn't a job we can do alone. We need your help to do it and we want your help.

One of the first things that I did when I took over and I had the first elements of a staff to talk to was to tell them this—that the businessman that came into our office seeking advice or seeking assistance was not to be treated roughly or not to be treated as a thief; that he was an American

citizen seeking the help of government and the assistance of government in meeting a problem that we had to face together, and that he was to be given every consideration when he came in. I think that those of you who have called upon us have found that that exists today, and it will continue to exist as long as we can have your help.

There is a mutuality in this program that cannot be successfully separated. Our part of the program cannot be separated from the part that you must play in making this program successful. If it is to be a successful program—and I have every reason to believe that it will be—it will be not only helpful to you, it will be helpful to the government, but it will be helpful to the nation and to the people who make up this nation.

It has been a great pleasure for me to come over here to talk to you just these few minutes because I want to do the best that I can in attempting to get this kind of a message out to the people that we have to deal with.

One organization came in just a couple of weeks ago and said that we were a consumers organization, but

that is not so. Everybody that we deal with are consumers at some time or other. I remember in handling some of the labor disputes in the City of Toledo when the mass transportation workers were out, every other worker besides the public was interested in seeing the transportation system restored to normal operation. So it is with you. Today you may be selling canned foods or producing canned foods, but yet you are still part of a large consuming public interested in keeping costs down, because in keeping those costs down we may be able to keep taxes within reason. It is necessary that we beat inflation because if we don't, the pension plans and the retirement programs that you are planning will go by the board. So all of us have a stake in the success of this program.

With your help and with the sincere desire that we want to see this program succeed, not because we want to control the economy but because we want to help the economy work at a time when there are some exterior forces attempting to dislodge it, it is at a time like this that we need your most sincere cooperation and we solicit it.

often come only when we can no longer hear them.

I have been asked by the Association's Committee on Resolutions to present to you its proposed resolution paying tribute to Mr. Gorrell.

"An institution is often but the lengthened shadow of one man. If ever was a man's work made manifest, this Association reflects the genius and goes forward on the momentum of its founder, Frank E. Gorrell. No edifice can symbolize the authority of his counsel, no formal structure be a fitting monument to his long years of unremitting and productive toil. Not even the universal recognition accorded the contribution of the canning industry to better living—measured so largely by what Frank Gorrell did to guide, to foster, and to fulfill its public purposes—can begin to impound the spirit or record the memory of this man engraved in the hearts of those who were privileged to know him. For he lived not for works but for men and women; served not just as leader but to each as friend.

"His warm and generous spirit encompassed an uncommon wisdom. His judgment was always above the partisan passions of the moment and voiced with a polite patience against which the error or dissidence of others beat in vain. Never was he the first to speak and the last to recant. Above all, his unique sagacity was founded on an understanding of things both great and small, on a profound knowledge of his dedicated formal task and on a penetrating insight into those lesser and more intimate things which to the individual friend were important, often to him alone.

"His innate kindness embraced all. No matter how intimate or casual the relation, his unassuming aid was always clothed in gracious courtesy. In moments of joy he was responsive, and in time of trouble he gave to each of us his quiet and complete consolation.

"His was the full life, rich in the reward of friends, each to mourn yet each to cherish and to share his own fond memory of this great one of the true elder race."

In evidence of the honor and love with which we revere his memory, I ask that you stand for a moment in silence.

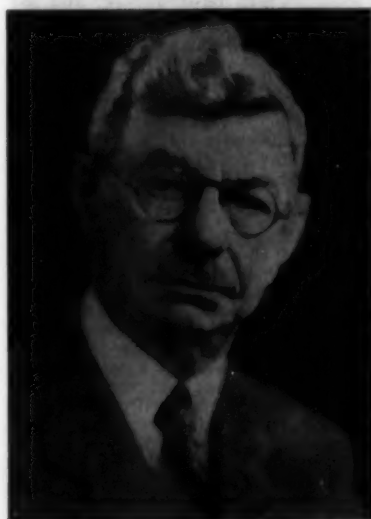
GENERAL SESSION

TRIBUTE TO THE LATE FRANK E. GORRELL

By Henry P. Taylor, President,
National Canners Association

On January 16 the canning industry lost one of its great men, Frank E. Gorrell. And yet we have not lost him and will never lose him so long as we remember the vision, the courage, the integrity, the patience, the industry and the high character which this unassuming and simple man possessed in so high a degree. His wisdom and instinctive appreciation of what is right and sound in large measure made the National Canners Association what it is today.

The industry is deeply thankful that this long and vigorous life ended on so high a note. Several years ago Mr. Gorrell was greatly depressed by the loss of his eyesight. Within the past year an operation improved it to the point where he was able to recognize his friends and to see most of what went on about him. But he had never lost his alert interest in current happenings, the industry and his many friends. His mind was as clear as ever and his memory as unailing, and that warm and human friendliness which endeared him to all who knew him had lost nothing with the passing years. Best of all, at the Gorrell Testamental Dinner in the celebration of



THE LATE FRANK E. GORRELL

the 40th anniversary of the founding of the National Canners Association in 1947, and last June when the new home of the Association was dedicated, he heard his friends pay him the sincere and heartfelt tributes which too

ADDRESS OF THE PRESIDENT OF N.C.A.

By Henry P. Taylor, President,
National Cannery Association

Members of the National Cannery Association, distinguished guests, ladies and gentlemen:

In something less than two hours I will no longer be your President. I want to thank you for the honor you have done me and for one of the happiest years of my life. The opportunity you have given me to see more of old friends and to make new ones has been one of the pleasantest things that ever happened to me.

When you elected me President I was keenly aware that there were a great many things which a little canner from down in Virginia did not know. Then I remembered that the staff, the Administrative Council and the Board of Directors would know these things and I stopped worrying. I have tried to do the things it seemed to me I might know a little about, but if the past year has been a good one for the Association it is due to the staff and the untiring efforts of those canners who have given largely and generously of their time in the work of the Association.

The completion of our magnificent new home in Washington is a testimonial to the efficient service of the Eastern Building Committee. The progress on the new Western Branch Laboratory building in Berkeley, which is to be dedicated soon, must be gratifying to the Western Building Committee. Bill Dietrich, chairman of the over-all committee, may be proud of having brought to so successful completion a job which had hung fire for so long.

Time does not permit me to name all those who have contributed so much to the Association this year, but there is no need to do so, as you know who they are as well as I do.

As this meeting closes a chapter in my life, so it closes one in the history of the Association. We have just paid tribute to our founder, Mr. Gorrell, whose life span encompassed the infancy and adolescence of the Association and saw it reach maturity.

Those of you whose memory covers the same period will recall the tremendous changes which have taken place in the canning industry, how mechanization has completely changed the output per man-hour in the factory and only to a less extent in growing the raw product; how exact scientific knowledge has replaced the rule of thumb that prevailed 45 years ago. You have seen the development of the motor truck modify immensely the problem of transportation both to and from the factory; and how the growth of the chain store has affected marketing and distribution. You have seen some canning businesses grow to gigantic size and others disappear and



HENRY P. TAYLOR
1950 President

die. With reference to the competitive situation brought about by the growth of chain stores, I said in a talk to the Tri-State Packers Association about 15 years ago: "Under the pressure of this abnormal competition, the weaker, less efficient producers will be destroyed, and the stronger, more efficient producers will grow and combine, until they, too, become giants, able to meet as equals the giant distributors to whom they sell."

In much the same way government control, especially the wage and hour law, has favored the efficient and hurt the inefficient. And yet it has not hurt the good little man. We see today, from one end to the other of this vast country, the intelligent little man doing the things which made the big canner big—planning carefully, diversifying, warehousing, financing, merchandising, building a balanced business, and in many cases advertising and selling his own brands in his marketing area. I have had men like this tell me that they are no longer afraid of nationally advertised products competition. On their own home grounds they can hold their own with anyone. And this is making a lot of small canners bigger canners, and it is compelling all canners to be better canners.

There should be a wonderful future ahead of the National Cannery Association, and there will be if we just remember the sound principles which Mr. Gorrell saw so clearly and which guided him in deciding the policies which the Association should follow. Perhaps the most important of these was that the Association should never

attempt to do anything which did not have the substantial support of the industry. We are a purely voluntary group organized to seek a common solution to our common problems. Any attempt to impose on any considerable minority a solution it is unwilling to accept can result only in destroying the usefulness of the common effort. We must limit our work to the things we can agree on.

The next policy in order of importance is perhaps that which recognizes that all solutions of our problems must include the public good as well as that of the industry; the next, that decisions must be made on the basis of facts and that one of the prime functions of the Association is to get these facts and make them available for the industry.

I would like to say, too, that within the Association each canner has the same opportunity to be heard, whether he is large or small. It has been my observation that the larger canners have leaned over backward to give the smaller canners every possible chance to share in making the policy decisions of the Association. The smaller canner should by all means make the most of his opportunity even though it may call for real sacrifice of his time to do so.

I would like to point out to you the wisdom with which the Association has been organized. All real authority resides in the Board of Directors, whose term of office is for three years with approximately one-third of its membership elected annually. Nominations for election to the Board are made by a committee from the state which the director is to represent.

This is a thoroughly democratic procedure, and one of the most important things the local state association can do is to see that the best men are nominated for this most important job—level-headed, dependable men who have and will give the necessary time for the work of the national association. Only in this way can you be sure that your local interests will be vigorously defended, and only in this way can the high standard of service on the Board be maintained and replacements had for those wheel-horses who have fought so splendidly the battles of the industry. One of the essential qualifications for this job is the ability to get along with and work with others.

While the Board as a whole must approve all policies, plans and appropriations, most of the actual work is done by and in the committees. It is here that opinions are formed and differences are ironed out and decisions are arrived at. In matters of particular interest, members of the committees in private conversation among themselves or with members of the Administrative Council or with those canners who may be most concerned, discuss thoroughly the different phases of the problem. This is

one of the most useful means of arriving at valid and acceptable decisions. The committee in charge of an Association function like scientific research, home economics or labeling, in its study of the problems involved, works closely with that division of the Staff and with the Secretary, and gets from them both information and recommendations needed in making decisions and formulating a report.

The method of electing the Board is a reasonable assurance of continuity in the management of the Association, but an even greater influence in this direction is the Administrative Council composed of the Executive and the Finance Committees. The Council is without power except to recommend to the Board of Directors. Its membership includes most of the past presidents and those older men who have been active in Association leadership over a number of years.

To it all of the committees report before reporting to the Board of Directors, and the Council discusses these reports thoroughly and makes recommendations with reference to them to the Board. The Board is under no obligation to accept the Council's recommendations, but so far as I know it has never failed to do so.

The great value of this organization and procedure is that it insures the most thorough study and discussion before any action is taken. The committees study, discuss and consult. The Council brings to bear the long and varied experience of its membership in making its recommendation. The net result is that the opinion has had ample time to crystallize before the matter is brought before the Board for a vote, and this practically insures the carrying out of Mr. Gorrell's policy not to undertake anything on which the industry as a whole is not agreed. It might be concluded that such a policy would stand in the way of accomplishment. It is more than probable, however, that the Association's outstanding record of accomplishment was made possible only by such a policy.

I have wanted to review for you the mechanics and the policies of the Association, because as the industry grows and changes there will be new personalities and new ideas, and these personalities and ideas will be most useful to the Association and the industry if they are brought into it in an orderly fashion. We have been and are very fortunate in those who run the Association and we want to keep it that way.

the inside looking out. I found that there are about as many troubles in the canning business as there are in the government in Washington. That is saying a good deal. I processed this last year about 800,000 cases of applesauce and some sliced apples and apple jelly and apple cider and apple butter.

So I have gotten across a little propaganda here. You know you must be a student of propaganda if you want to stay very long in Washington; otherwise, you can't exist there. I only hope that in addition to my competitors in the audience there are a few buyers to take recognition of the fact that I've got about 800,000 cases of applesauce to sell. But I will not personalize my speech except to make that comment.

I spoke the last time in Chicago on November 1. I spoke then to the National Association of Ice Industries. I happen to be an ice maker, too. I am in the storage business and I make some ice, so I came out here to speak to them. I then took a plane and went to Columbus, Ohio, and spoke to the Ohio Chamber of Commerce that night and was introduced by my great friend Senator Bricker. That was in the midst of the Ohio campaign and I thought I should say something about Senator Taft, though he is a Republican and I am a Democrat. It was a hot campaign; you could see that everybody was deeply interested. I said that I voted with Senator Taft a lot in the past and I hoped I would vote with him a lot after November 8.

When I got back to Virginia, the papers said that Byrd had gone out to Ohio to make a speech for a Republican, Senator Taft. The statisticians in Washington—and there are a great many of them there, although what they do I don't know except that they draw pretty good salaries—they got out a very terrible indictment of me the other day and said: "Byrd has voted 66 percent with the Republicans. He has voted more with the Republicans than any other Democrat; and furthermore, he has voted more with the Republicans than they have voted with themselves." Well, I haven't denied that in my Democratic State of Virginia.

I am proud of the fact that I am one of 16 southern Senators who voted with Senator Taft to prevent the repeal of the Taft-Hartley Act because if that Act had been repealed in the political atmosphere in which the President of the United States asked for the repeal, to pay a political debt that he had incurred in 1948, I say to you that these ruthless labor leaders, Lewis, Petrillo and the rest of them, would have believed, and rightfully so, that they were greater than the government of the United States. So I was very glad to vote

OUR PROBLEMS AT HOME AND ABROAD

By The Honorable Harry F. Byrd,
U. S. Senator from Virginia

Mr. President, ladies and gentlemen: We Virginians have a custom which we always observe and that is that we speak well of each other when we are outside of the state. I often wish that that custom would prevail within the state in some of my political campaigns.

I am delighted to be here today for a number of reasons; first, to express the appreciation of Virginia that this great organization, because you are a great organization—I know of no more important segment of industry today than that that has to do with the processing of food in all its different forms—to express our appreciation that you honored a Virginian, Henry Taylor, as President of this organization. Henry Taylor represents the very best in Virginia and stands for everything that is good and right in our life. I am glad, as all other Virginians are, that he has had the privilege and pleasure to serve in this honored organization.

Then I am glad to be here because I know what a fine audience I have the great pleasure of addressing. And again I am glad to be here because I am in the canning business myself. I am not in it because of my own choice but I am in it because I have to be in it. I happen to be an apple producer and when my crop got so large that



HARRY F. BYRD

the canners could not handle it, I had criticism from these local canners because apples are a perishable product and have to be handled properly. They did the very best they could. I have established a canning plant. I found that it was very different looking from the outside to the in of the canning business than from

with Senator Taft that time because he was right, and I intend to vote with the Republicans whenever they are right and vote against them when they are wrong. An answer I make to the charge of voting with the Republicans, is that my name begins with a "B" and I vote first and the Republicans vote with me.

You perhaps wonder what kind of a Democrat am I. I think I had better identify myself. We have all kinds of slogans and all types of public men these days. I try to be the kind of Democrat exemplified by two of the greatest Presidents that this country ever had, Democrats both of them and both from Virginia: Thomas Jefferson and Woodrow Wilson. I am the kind of Democrat that Andrew Jackson was, who boasted of the fact that his proudest achievement in his administration was that he paid off in toto the public debt. I am the kind of Democrat that Grover Cleveland was, who said that the people should support the government and not the government the people. So that is the kind of Democrat I am. You can draw your conclusions in your own mind as to whether I am a New Deal Democrat or not. I do my best to vote for what I regard to be the best interests of the American people.

After all, ladies and gentlemen, in these great issues that now confront us—issues that will determine the destiny of this country, that may determine whether we shall live or die—political parties mean little, they come and go, but what means a great deal is to preserve those great principles of government enunciated by those men I have mentioned today, and Henry Taylor referred to those principles of government that have made America the greatest of all the nations in a brief space of 160 years.

I heard a new definition of a "reactionary" the other day in Washington: He is a man who believes that the budget can and should be balanced. Such a man is a reactionary in the opinion of many in Washington.

Problems Abroad

Now the subject assigned to me today is "Our Problems at Home and Abroad." I am going to take out my watch now because that covers a lot of territory. I will not attempt to discuss with you all of the problems that we have at home and abroad. To do that would take all afternoon and the rest of the night. That reminds me of one of the first speeches I heard when I came to the Senate. It was made by Huey Long. He spoke for 16½ hours and when he sat down he said, "I will conclude my remarks tomorrow." I don't intend to treat you like that. I will first deal somewhat briefly with our problems abroad.

In the coming years and perhaps for generations, we have two great burdens to carry. On the one hand we must make ourselves so militarily

strong as to protect us from the aggression of Communist nations, and on the other we must preserve and fortify our free private enterprise system, which, after all is said and done, is the real source of our strength and future security. The free enterprise system is a great deterrent of world conflict and a more dependable force for peace than the United Nations organization will ever be. It is the only force in the world that Russia fears and recognizes.

Let us not be deluded. The emergency in which we find ourselves will exist in all probability for many, many years to come. Today Russia has the timetable and Russia can control the initiative. She began the war in Korea, and Russia has not lost one single soldier. We shall have to live for a long time in a period of crisis and be on a war footing even though World War III does not materialize, and pray God it will not.

General Bradley has said to the Senate Armed Services Committee, of which I am a member, that Russia can turn these sideline wars on and off like a spigot of water. She can bleed us white before the test comes when we may be called upon to fight the combined might of Communist nations. If Russia determines to wage war, she can fix the hour, the day and the place of the conflict, or she can for years to come conduct against us a war of economic attrition. This may be her sinister purpose. I am somewhat inclined to think and believe that it is, and in the past five years she has made great progress in this direction.

Russia has succeeded in immobilizing practically all of the trained troops of the three leading free nations—the United States in Korea, France in Indo-China and England in and around Hong Kong and the Malay States. For ourselves, we have spent \$60 billion for defense in the past five years and have only one well-trained division at home, two in Europe and about 175,000 troops fighting in Korea where we follow the flag of the United Nations but do so nearly alone. In Korea, exclusive of the South Koreans, 90 percent of the fighting is being done by the Americans.

While the army is tied down in Asia, Russia is no doubt planning devilment in Europe and may strike in Iran, either by attack or infiltration, and assure herself the greatest oil reserve in the world, a victory greater than winning the war in Korea as long as we are unable to do anything about it.

I am not an appeaser, I think you know that, but I say that our future security depends upon a definite as well as a realistic foreign policy. We jeopardize our future if we continue to pursue a vague policy of impractical altruism. Russia has a firm

and definite policy, and she has outplayed us in every card in the diplomatic game. Our policy must be realistic. We serve neither ourselves nor the free people of the world when we undertake burdens beyond our ability to carry, make promises we cannot fulfill. We may be powerful but there is a limit beyond which we cannot go and survive. We cannot go over all the world like Don Quixote, tilting our lances at every windmill. We cannot go all over the world trying to make democrats of people who do not want to be democrats and who do not in fact know what the word democracy means. If first things are to come first, what we need above everything else is an impregnable national defense at home. This may determine whether or not we will survive. As a member of the Senate Armed Services Committee, I pledge to you that I will do, and have done, all in my power to provide an impregnable national defense at home.

I am for compulsory military training. I am sorry that we have to have it, but it seems to me that this is necessary. I am for a trained army within our borders. We now have 2,200,000 in the Army and recent legislation will authorize a total of 3,000,000. I am for a 70-group Air Force, or more if the occasion requires it, and I am for a radar screen around this country so that airplanes with hostile intent can be detected. These things I have been advocating and voting for for years. And I am for a great Navy. There were those who thought that when the atomic bomb was developed, our Navy should be minimized and put in the discard, but I think we can say from the conditions in Korea that both the Navy and the Marines stand as a backbone of the national defense of this country.

Problems At Home

That is what I have got to say briefly about the conditions abroad. I could discuss it for hours but I do not think any good purpose would be gained by that because I believe you know the critical and difficult and terrible situation which confronts us and which, let me emphasize again, as General Eisenhower said in his splendid address to Congress about 10 days ago, may last for 10 years or 20 years or 30 years. Nobody can predict the length of it.

Now about some of our problems at home. On December 23 I wrote a letter to the President of the United States. You know, it is a brave man that writes letters to the President. I suggested to him as politely as I could that there could be reductions in what we called nonessential, nondefense expenditures. I sent him an itemized statement, in fact, with great humility on my part, with no desire to have any controversy about it, and with the hope, however, that it would be favorably received.

At the press conference on December 28 he said to the assembled newspapermen, on inquiry, that he did not think Byrd knew anything about the budget and he had not read his letter but he was going to make a reply to it. That made me extremely uneasy. I had not received any letter. I finally got a letter dated January 2, which I want to read to you. It was a very nice letter. It says:

"My dear Harry:"

(We served in the Senate together; we sat next to each other. Right here in Chicago I voted for him for Vice President against Wallace. I won't say exactly all my reasons for voting for him but I voted for him against Wallace. The Virginia delegation voted for him and the South gave him their votes. You recall that the Convention adjourned about 4 o'clock in the afternoon in order to mobilize to defeat Wallace, who had gotten about 400 votes.)

"I appreciate most highly your letter of the 22nd. I have always tried my best to make the revenue meet the expenses of the government and had it not been for the action of the 80th Congress there never would have been a deficit for any year in which I have sent a budget to the Congress."

(The facts are that the only time the budget has been balanced in the last 18 years was in the history of the 80th Congress. For some reason the President has it in for the 80th Congress. Whether it is because they balanced the budget or not I don't know.)

"Present conditions are such now, however, that it is necessary to tax until it hurts."

(I agree with that, providing that the government economizes on this nondefense spending till it hurts. The two have got to go hand in hand. If the President wants the people to make sacrifices by paying taxes until it hurts, then let him economize in the luxuries of government so that it will hurt some there too.)

"Expenditures for the general government have never been excessive or extravagant."

(There could be an argument about that that could last for 30 days.)

"It has been my privilege to help with the making of ten budgets while I was in the Senate. I have made five since I have been President. I am now working on another and there is never a figure goes into the budget message that I am not familiar with."

(I am willing to pay tribute to Mr. Truman's ability but I say that no man living knows every figure that goes in this astronomical budget of \$72 billion that goes before the Congress.)

"I am very highly pleased with your report in the present emergency. I don't think there has ever been any

serious difference of opinion between us on the operations of the government except maybe in policy approaches on which we naturally would not agree."

(I haven't agreed often with him on his domestic policies.)

"Thanks so much for your kind letter."

I got three thanks and the subject matter of my letter was never even referred to, which was to urge him to reduce the nonessential expenditures.

Some of my friends then suggested that I ought to reply to this letter. I thought about that a good while. I said, "No, I have gone through the fire and I am not going to take another chance on it; if I make a reply I know not what kind of a reply I would get sent back to me, so I think as long as I escaped as well as I did I had better leave well enough alone so far as this letter-writing to the President is concerned."

Highest Nondefense Budget

Then on January 15 the President appeared before the Congress and made this specific pledge to the people and to the Congress: "If the government must practice rigid economy in its activities, many of the things that we would normally do must be curtailed or postponed." A week later he submitted to the Congress a budget which actually increased nondefense spending to the highest point in the history of the nation, whether in peace or war, in this perilous day that confronts us, to the highest level we have ever reached in time of peace or war. Not only has he in time of peace failed to keep his pledge but the President renewed in this budget his advocacy of socialistic measures known as the Fair Deal. The Fair Deal, as you know, is a little worse than the New Deal.

He asks citizens to make deep sacrifices in their daily living and he declines to make political sacrifices by curtailment of proposed measures for the distribution of public funds. In my experience of 18 years in the Senate this message represents the very height of fiscal irresponsibility. Unity and sacrifice to save our country must be a two-way street. They must come from the government as well as from the citizens.

It is unnecessary to say to you that our fiscal preparedness is just as important as the military; in fact, without fiscal preparedness, without the capacity of this country to pay for the things that we must have and of such costly character, then we cannot achieve our military preparedness.

The President advocated the Brannan Plan in his budget, which I shall make some reference to later. He advocated socialized medicine, socialized housing, expansion of government-owned production, federal aid to education.

Federal aid to education if adopted will open up a Pandora box of spend-

ing. When the federal government starts to aid the public schools of this country, there will be no limit to the cost; but worse than that, when the federal government subsidizes a state activity, sooner or later they take control of that activity. One of the things we must avoid above all others in these difficult days ahead of us—when we know not what man of great ambition may head our government—is to avoid the federal government controlling the education of our children. You know what Hitler did with that in Germany, yet today the President has \$300 million in his so-called rigid austerity budget to begin a program to aid public school education. I don't think he called it "austerity." That is a little too strong, but he said it was a very "tight" budget and he said it can't be cut in any way.

I think for years in this country we have followed a false philosophy. Ever since the last war we have followed the philosophy that American money can do everything. It can buy off Communism, it can buy friendship all through the world, it can do this and do that, but I think now we are finding ourselves disillusioned. We are finding that we are doing the fighting in Korea. Those that have been the recipients of our bounty for the past five years to the tune of \$40 or \$50 billion are not at our side except in very small numbers when American boys are dying in Korea.

You also know when you talk about giving charity in this wholesale way—as we have been doing it in the past five years—that charity can do as much harm if ill-advised as it can do good. Whenever you start to give money to even a member of your own family and then stop it, there is some little friction likely to develop. I know. I give a check every month to Mrs. Byrd and I think she is a very fine person, but if I stopped giving her that check without the best reason in the world for doing so, I would be afraid to go home on pay day. You know giving this money wholesale all over the world and then stopping it, as we have got to do, is going to create resentment and will probably destroy whatever good effects resulted from the volumes of funds spread everywhere.

We have been generous with Russia. I don't mean we have in recent months or years, but we have been since the war was over. Russia was given billions of dollars of our materials, Lend-Lease materials and others, and as a member of the Armed Services Committee we had a meeting the other day with Admiral Sherman to try to get back 535 warships that Russia has right now, American warships, yet she won't deliver one single ship to us.

We have given away in the past five years six States of Virginia.

Somewhat my thoughts go back to this State that I have the honor to represent because I love it so. The tangible wealth of Virginia is about \$8 billion. That wealth is not my wealth or the wealth of this present generation. It is the accumulated wealth of Virginians from the first time permanent settlers landed at Cape Henry, Virginia, nearly 300 years ago, the accumulation of the thrift and industry of Virginians for all that time, and now we have given away six States of Virginia and we are giving away one State of Virginia every year.

I ask you as sensible men and women how long can we continue to do that and preserve our solvency? I do not think it can be done so much longer if you judge anything by all human experience because no matter how rich you may be there is always a bottom to the well, there is always a bottom to your pocket. We don't know when the bottom of that pocket is coming, but unless we change our course I don't think it will be very long away.

Free Enterprise

Let me ask you, why is America great, why is America so outstanding among all the nations of the world, I say with all humility, recognized as being the greatest of all the nations? It is not because of our population. We have only 6 percent of all the population in the world. It is not because of our land area. Look upon the map and you will see the United States of America, our 48 states, a small spot on the world area, and you will not see a single addition to those 48 states during the life of our Republic because we have ever been aggressive, we have never tried to conquer territory. We are not great because of our natural resources. These, incidentally, are being rapidly depleted, much more rapidly than you and I are conscious of. We are great because of the free enterprise system in America, because of the spark that is in the heart of every American, knowing that he can start at the bottom of the ladder and by his own efforts, by his own industry, by his own self-denial go to the top. No other nation in all the world can offer that opportunity to its citizenship except here in the United States of America.

That is what Russia fears. She does not fear sending arms to France. I say nothing derogatory of France, I say nothing derogatory of England, but can they offer opposition effectively under conditions that confront them? Russia doesn't fear that. What she fears is the mass capacity of this country to produce those things that kill people, produce more than all the rest of the world combined. She knows something of it because we gave her most of the implements of war to drive the Germans from her soil, and, had we not done so, Germany may have been victorious.

Whatever is done to destroy the private enterprise system in America we have destroyed the greatest safeguard we have, the only protection, as I see it, in this troubled world and in these terrible conditions that confront us.

Take the production of steel. We produce now twice as much as all the rest of the world combined in the production of steel, which is the very base, as you know, of raw materials. Russia with the Soviet form of government, her slave labor—and that is what she has—has been unable to produce more than 25 million tons of steel. We produce 110 million tons of steel and are rapidly increasing and can produce more steel than all the rest of the world combined because we have here the free enterprise system, which I want to emphasize is the greatest protection that this great nation has and is the greatest wealth we have, greater than the towns and cities that have been built, greater than our great industrial establishments. It is the vital spark in the heart of America, stimulated by the opportunities of the free private enterprise system.

The President said not long ago that it was an insult to the intelligence of the American people to say that we were on the road to socialism. I have said, and I have said it with all sincerity, that I believe that the adoption of the President's program as now before the Congress will irrevocably commit this country to state socialism from which there can be no retreat. I would not make such a statement as a U. S. Senator unless I believed it, unless I did my duty to present my views that these measures that the President of the United States is pressing upon the Congress if adopted will mean state socialism, and I want to give you just a brief bill of particulars.

The President says he is against socialism. Let me ask him why he is pressurizing Congress to adopt socialized medicine. There is no question about that being socialism because England admits that she has socialized medicine, and Oscar Ewing was sent over to England to ascertain the effect of socialized medicine over there and has come back here to propagandize this country to adopt the same system. They may call it national health insurance or whatever they please but socialized medicine is what they are proposing to force upon this country.

It is said that socialized medicine will cost \$20 billion a year. That I think is conservative as we in this country don't do things halfway. If we start to do something of that kind whereby we pay the cost of those that are born, take care of them through their life and then bury them, we do it in a pretty grand way. But I will

accept the statement of \$20 billion, and these statisticians to which I have referred—I mean no criticism about them, they have their work to perform and they get out many statistics—well, they say that in 50 years \$20 billion makes one trillion of dollars. I can follow that. Twenty billion times 50 makes one trillion. They say further that if you placed one trillion of dollars on top of each other it would extend 2,096,000 miles high, reach to the moon seven times with enough left over to pay the present national debt. I haven't had time to check on that. If you gentlemen or ladies have any spare time on your hands, it would be good for you to make that estimate.

Now the President is for the Brannan Plan. There is nothing more socialistic that has ever been proposed to any people than the Brannan Plan. The only sincere thing that Mr. Brannan has said about the Brannan Plan is that he could not estimate the cost of it.

What does the Brannan Plan mean? The Brannan Plan means this if I understand it: It means that I as an apple grower will sell my apples at any price that I can get. I don't have to put up a good pack, I don't have to make an attractive sale, I don't have to go out and send salesmen around. Speaking figuratively, you could put your apples on your doorstep and say, "Come and get them," and then if I get 50 cents a bushel I go down to Washington and get 100 percent parity, \$2.50. If my neighbor can get \$1.00 for his, he goes down and gets \$1.50 more and he gets \$2.50. That is the Brannan Plan. The purpose of it is to reduce the cost of food to the consumer and still pay the farmers the same prices that they are now getting.

I went over to hear Mr. Brannan testify before the Committee. He made an appealing speech. Some Senators finally said, "That's a very fine scheme, Mr. Brannan. We want to reduce the cost of food to all the consumers and the farmer is going to get just as much money as he got in the past, but it doesn't quite connect up. Who is going to pay the \$8 or \$10 billion to bring that situation about?" Mr. Brannan said, "I could not discuss how that is to be paid. I am presenting to you this general program."

Brannan Plan Still Advocated

We want to reduce costs, yet I don't know where the processors are coming in under the Brannan Plan. You probably will get caught between the two. Your name will be "mud," let me tell you.

The Brannan Plan is still in advocacy right in the midst of this emergency and it is in the President's budget.

I say that if we socialize our health, socialize our food and socialize the roof over our heads, then we have

gone where England has gone. We have gone so far from which there can be no retreat.

That is something we want to think about in this country. We see right before our eyes what is happening to these English people that we love so well. All of my people came from England. Most of yours came from there. They are our friends. They are about the only people in the world that we could depend on in a knock-down and drag-out fight, it seems to me. Yet in England today only 70 people out of a population of 42,000,000 are permitted to take home and spend as they please more than \$16,800. They have liquidated the rich in England. That is not hard to do. We could liquidate the rich in America by requiring them to pay a small part of the deficit that we are going to have just for one year. Take everything the rich have and it would not pay that deficit. England has liquidated the middle class. There are only 231,000 in England who have incomes of \$2,600 to \$5,600. The farmers are under controlled regimentation that is simply unbelievable.

I take the *London Times*. I used to sell a lot of apples over to England. I don't sell any now. You not only have to give them but you have to pay the freight. Maybe some of us would be willing to give apples away when they are worthless but we don't feel that we can pay the freight, too. The other day I got the *London Times* that was sent to me by one of my friends. It had an article giving the names of about a hundred farmers, saying that they were guilty of bad husbandry because they did not do all that the government told them to do, and the article said that unless they mended their ways and obeyed the orders from the government, their property would be confiscated. Not paid for, not condemned, but taken away from them. That is the situation that exists in England.

They have taken over the steel business, and they have socialized the lawyers. I believe that is pretty dangerous because lots of people like to go to law and, if they feel the government is going to pay the expense of lawyers, they will find that the courts will be cluttered up with lawsuits.

I want to give a Byrd's-eye-view of the budget. We started World War I with a debt of \$1 billion, we started World War II with a debt of \$40 billion, and if there is a World War III we will start it with a debt of \$260 billion. That is serious.

The President's budget provides for an expenditure next year of \$72 billion. On an income under present taxation of \$55 billion, that leaves a deficit of \$17 billion. That is an awful lot of money.

The President the other day issued a challenge and said that no one should dare to reduce the budget, that the Congress should not dare to do it. I don't think that is quite the right spirit when we are all working for the common purpose: trying to protect the future of America; trying to keep ourselves from going as other nations have gone and being destroyed.

I for one hope that the Congress will take up that challenge because, after all, the Congress only can appropriate the money. We haven't got to a dictatorship here yet, and pray God we won't, and as long as Congress controls the pursestrings, that is the greatest safeguard we can have from becoming a dictatorship. We should perform this function without coercion and threats. I hope Congress will do that.

The President said last year that you could not cut the budget, it was a tight budget. Congress cut it \$2 million. Then he put all of those cuts back in his present budget and that all has to be gone through again.

Pay-As-You-Go

One thing will save this country from insolvency, and that is pay-as-you-go. That is the plan we have in Virginia. We don't have an iota of debt in Virginia. I was elected Governor 25 years ago against a road bond issue, pay-as-you-went. We have done that. I think most Virginians will agree with me that we have a very fine road system. We maintain and construct every single mile of roads of the state on a pay-as-you-go basis and we are completely free of debt.

You will never go broke if you pay as you go. You might have heavy taxes to pay but you are never going broke as long as you take in as much as you pay out. But for the last 19 years we have only been paying-as-you-go for two years.

The President wants to pass a "quickie" tax bill. That seems to be a new thing. Things have got to be done "quickie." He wants to put \$10 billion on the people in the "quickie" bill. We passed two "quickie" tax bills. That was too quick when you see some of the provisions in them.

I am on the Finance Committee.

The tax bills already enacted are going to increase the tax revenue from \$37 billion to \$55 billion. That is a pretty good increase already. Now he wants a "quickie" bill of \$10 billion more to be followed later by another tax bill of \$6 billion.

We have already taken off the fat, and some of you, when you get the tax bills, will think we have taken off more than the fat. Now we have to go into the muscle, we have got to go into the lean meat, we have got to go into bone structure, and I say unless we distribute this tax increase in a just and equitable way to all groups

of our citizens, what we will do then is destroy certain groups or maybe destroy all of them if it keeps up.

So I don't think there is going to be any "quickie" tax bill. I hope there won't, anyway. As a member of the Finance Committee, I am going to oppose it. Senator George is opposed to it, Senator Taft is opposed to it, and so are several others. We have to take the time to consider this colossal increase that is going to be put on top of two tax bills already passed.

I say the first thing is to close the loopholes in the tax laws and we ought to start with the President. He has got a loophole. He has \$50,000 tax-free for expenses. I don't object to the President's getting his expenses, he already receives expenses for official matters, but no citizen of this country in my judgment should get money from the federal treasury by way of expenses unless he submits to the Bureau of Internal Revenue a list of those expenses and has them deducted as you and I and everybody else have to deduct them. So we will start there.

Then we ought to go to the Vice President and let that \$10,000 be taken away unless he furnishes a list of legitimate expenses; then to the Speaker of the House; then to the Senators and Congressmen who have \$2,500 tax exemption.

I voted against it. I voted against all of these tax exemptions. I do not feel that in a democracy there should be any exemptions in taxes because taxes should be paid by everyone.

There are a number of other loopholes. We ought to have an improved tax assessment and collection system. I think a lot of taxes are evaded.

Then we must eliminate every single dollar of nonessential spending, and then we should start to raise the taxes to make up the difference. I think we could get a good many billions of dollars.

If you desire to have it, I would like to send you a statement that I sent to the President as to how these expenses can be reduced, all nondefense expenditures, to the extent of \$8 or \$9 billion. We can save 10 percent on this total budget. We can do that and not affect one single and necessary operation of our government, and 10 percent would then reduce the amount needed from \$16 billion down to about \$9 billion. I won't take up your time to read these figures but if any of you would like to get a copy of these to inform the people, I would be very happy to send it.

Before I get off this subject about the Washington government, I want

to make one exception and that is to Ralph Trigg, who is at the head of the Commodity Credit Corporation, who sits with me on this platform. I want to say that he is an official of this government that all Senators and Congressmen have confidence in. Whether oldtime Democrats or new-time Democrats or whether they are Republicans, they have confidence in Mr. Trigg.

There are a good many other good people in government. I am not criticizing everybody. There are 2,000,000 of these government employees. I would not say that all 2,000,000 of them are not doing proper work. Of course, there are a great many splendid and able men in the government.

Now we must put Santa Claus in the deep freeze during this emergency, put him in the deep freeze, put him there and let him be frozen like this woman in Chicago was, but not to get well quite as soon. I am glad she got well, but I would not want Santa Claus to get out of the deep freeze that quick. He ought to be in the deep freeze for the duration of the present emergency. Then if we can overcome some of these conditions, if we want to go back to luxuries of government, we can do it. That is what you would have to do in your own business. You would have to put luxuries aside in a great emergency like this and that is what this government should do.

My budget is an austerity budget, but it would not hurt as much as new taxes. Let me say to you right now if you have \$16 billion more of new taxes placed upon you, there are going to be difficulties we have never conceived of in the private enterprise system of this country. Because, after all, we must recognize that when you destroy the profit motive in the private enterprise system, you have destroyed the very heart of that system.

I have often thought, when can a democracy become insolvent? It is not impossible of course to become insolvent. I believe that the first signs of insolvency of a democracy are when the taxes are so high as to bring in diminishing returns. That is the warning. Then the practical demonstration of a creeping insolvency is inflation, and that is what we have now, when our dollar today is worth only 50 cents as compared with 10 years ago, worth only half as much in purchasing power as it was; in fact, in building supplies it is only worth 40 cents. Suppose it goes down in the next 10 years to 25 cents as compared with 1940, and in the next 10 years to 10 or 12 cents, and our currency is destroyed and our government is insolvent because the money of the government isn't worth anything. That is my fear. There are signs right now that warn us all

that we are creeping and going toward that terrible result.

We are adding 1,000 new employees every day to our government, added to the over 2,200,000 employees now. One regiment of troops is only 4,000, so in four days we are adding into government service the equivalent of one regiment of troops.

No effort is being made whatever in Washington, so far as I know, to supply the needs of the military from civilian personnel of overloaded non-defense agencies. We have got 1,000,000 civilian personnel in the military. No effort is being made to take these from departments that could spare the civilian personnel, because there is hardly any department in Washington that is not padded with personnel.

Now we hear a lot about state grants. We have got to cut to some extent state grants, ladies and gentlemen, if we are to balance this budget.

My great colleague, Senator Glass, with whom I served many years in the Senate—one of the greatest men I ever came in contact with, it was a great privilege to me to be with him as a colleague—time and time again he said to me, "Harry, there is no such thing as state grants. The money comes from the people of the states and goes down to Washington. Then the bureaus and employees take 'deducts' out of it."

I know something about "deducts" because I am in the fresh apple business and I send my apples to commission agents when I can't sell them for a fixed price. When I get the returns back, it is deduct this and deduct that and I hardly know what I am getting.

That is what is happening in money that you send down to Washington. The "deducts" are taken out and balance sent back to you, and then you are told how to spend your money.

No Turning Back

One more comment and that is that we must fight Communists at home as well as abroad. I do not charge that there are Communists in high position in Washington but I do say that Communists have infiltrated this country, especially in our national industrial life. Communist infiltration is clever and not easy to trace. Unfortunately, we were unable to trace the Communist Fuchs, who conveyed our atomic bomb secret to Russia. This man was sent to America by the British. We had a treaty with the British. They certified that he was a loyal citizen. He came to this country and got the true secret of the atomic bomb and then admitted that he gave it to Russia.

I was told the other day by Dr. Vannevar Bush, one of the greatest scientists and one of the finest of people, that that information will advance the time that the Russians will get the atomic bomb by two or three years, and that may be the difference in survival with us because many think that

Russia will not attack until she has equality in atomic bombs.

So I say we have to fight Communists at home here as well as abroad.

I voted for the bill compelling Communists to register. Why shouldn't a Communist register? The bill was vetoed but was passed over the veto of the President.

We must keep up the fight for economy even though it may be very discouraging. It has been very discouraging. I have been voting against these things. I came to the Senate and took my oath the same day Mr. Roosevelt did, March 4, 1933. The title of the first bill I voted for upon the recommendation of Mr. Roosevelt was "To preserve the credit of the U. S. Government." That bill proposed to reduce all the expenses of government by 15 percent. That lasted for six months and, from that day to this, the federal government has been squandering and wasting the substance of the people of this country.

I do not say that with prejudice. I am stating a fact. I am stating something that I saw happen under my eyes day in and day out for a space of nearly 18 years. And we must remember this—that a new generation has grown up since March 4, 1933. They know nothing but deficit spending. Our sons and daughters don't realize the terrible consequences of deficit spending continued to the time that it may impair the solvency of our country. So I say that we have got to continue to fight.

Remember this, too, that in these days ahead of us—and God only knows what is going to happen—it is only America that can hold the torch for a free people. We took the torch from England, we have done our best to carry that torch, but who will take it if we fail? There is not a nation or combination of nations that can take the torch for freedom if America falls. Should we fall, there will be international darkness over the world. There will be no international trade because the only money that any people anywhere have confidence in is the American money.

In conclusion, let me say—and I say it with all the emphasis that I am capable—we cannot carry the world on our shoulders abroad and the New Deal on our backs at home. Let us always remember that human freedom is not a gift of men, it is an achievement by man; that it was gained by vigilance and struggle, though it may be lost by indifference and supineness.

I give you the words of a great American, Benjamin Hill of Georgia, who said:

He who saves his country saves all things,

And all things saved shall bless him. But he who lets his country die lets all things die,

And all things dying shall curse him.

AGRICULTURE IN THE DEFENSE EFFORT

By Ralph S. Trigg, Administrator,
Production and Marketing
Administration, USDA

Mr. Chairman, Senator Byrd, distinguished guests, ladies and gentlemen: I can promise you that my talk will be rather brief, the principal reason being that I have to catch a train back to Washington to appear before a Congressional Committee in the morning. For the benefit of those of you who have not had the privilege of attending a Congressional Committee hearing, you don't show up late, you try to get there on time, so I do have to leave soon. But I want to say to you that it is a real pleasure to be here. It is an opportunity for me to visit with you firsthand on some of the problems, some of the responsibilities that have been given to us in the Department of Agriculture toward mobilizing of food resources of this nation in this defense effort that we are now busily engaged with.

You heard Senator Byrd refer to many of the things that are being done and will be undertaken in the near future, but our responsibility, as pointed out by your President Henry Taylor—whom I have had the privilege of working with a great deal during the past year and whose relationship with the Department of Agriculture has been splendid—one whom we have found was willing to help us in any way he possibly could and put your Association behind him in doing whatever he could to solve these problems that we have all been confronted with—you heard him say to you that it was the desire of your industry to have all of the responsibilities insofar as food is concerned centralized in one government agency in Washington.

I want you to know that I agree with that 100 percent. I think it is sound, I think it is logical, and I think it will work. It is working, and with the aid and assistance of such industries as the canning industry and other food groups throughout the nation I am sure, when the final bell is rung, we will do a good job in mobilizing the food industry in this defense effort.

Essentiality of Food

Of course, it is unnecessary for me to point out to you how important food is in the national picture. We are spending a lot of money, we are mobilizing a lot of people, we are doing a lot of things in connection with the defense effort, particularly the procurement of arms, ammunition, and other things that you actually fight a war with, but I can say to you

that there is no more important weapon in any defense effort than the things that go behind those, and that is food of various kinds. I don't see how we can last very long in any effort if we don't have sufficient food, adequate food, the proper kind of food, and have it at the right places when it is needed.

That is our job in the Department of Agriculture—to see that the food resources of this country are mobilized from the time or even before the



RALPH S. TRIGG

time it is produced until it is consumed on the table. In other words, we accept the leadership and the responsibility that was given to the Department of Agriculture by the Executive Order of the President, coming as a result of the Defense Production Act of 1950, which the Secretary further delegated to the Production and Marketing Administration. We accept that responsibility and leadership in getting ready the food resources and having sufficient food on hand.

How are we doing it? We have asked for all-out production of food. Virtually all controls for the production of food have been taken off. There are no major food commodities that still have any controls on them. We are asking for sufficient food so that there will be a quantity of food, any quantity that is necessary, available at the proper time to feed the troops that are mobilized in the defense effort, to feed our civilian population, to keep our civilian

economy healthy, and at the same time make whatever is necessary available to our friends abroad.

This is a big job, but it is one that the farmers turned to and performed in the last war. Actually, the food production at this time is approximately 40 per cent higher than it was before World War II. We have every reason to believe that it can be maintained there, provided we get some of the things that go into the production of food. It is absolutely essential that we have fertilizer, insecticides, pesticides; we must have steel that goes into farm machinery; we must have labor for farmers; we must have, above all, a pretty fair break on the weather. Those things, though, are absolutely essential.

It is also essential for you people in your industry to have such things as the vital and critical materials that go into the processing equipment that processes the food. You must have tin that goes into tin cans. Steel must be set aside. Provision must be made for getting many other materials.

Coordinated Planning

That is our responsibility—to see that you get those things, to see that the farmers get what they need, to see that the distributive trade has sufficient incentive to distribute the food after it is processed. This is not easy for the simple reason that we do not have the final responsibility for allocating steel, for allocating the ingredients that go into insecticides, and so on down the line. That responsibility is in another part of the government—which I think is right. I don't think that the responsibility should be split. One place should have the total responsibility for allocating the steel needed in the defense effort. That is in the National Production Authority. But our place in the sun is as a claimant agency for whatever is needed for food production.

We have commodity branches in the Production and Marketing Administration. We have such units as the Fruit and Vegetable Branch which is headed by Si Smith, who spoke to you yesterday; we have the Livestock Branch; we have the Grain Branch, and so on.

The reason I describe that to you and give you just a little bird's-eye view of the organization of the Production and Marketing Administration is so that you will know where to go when you come to Washington and need help. I don't believe that people coming down there should have to wander around for days and not be able to find a place in the government where they can go to get an answer. I think we are all in the government for one purpose and that is to serve

the people we work for—the taxpayers of this country—and I feel very keenly about that. I feel that Washington exists simply because there is another part of the United States that spreads over a great and vast part of the country. If we did not take that view, there would be no reason for myself and thousands of others who are working down there, if not to serve you and to serve the people who pay the salaries of us in the government service.

If you want to know whether or not you have sufficient tin for tin cans or whether or not you have sufficient processing equipment of some kind, I think you ought to have a place to go when you come to Washington. The place for you to go if your problem pertains to fruits and vegetables is to our commodity branch in the Production and Marketing Administration which is headed by Sy Smith. If it is in connection with the canning of meat, go to the Livestock Branch. If it is in connection with something else, go to that particular commodity branch. Your problem should start there, and I can guarantee you that we will follow it through until you get a complete answer. It may not be the answer you want because we may not have the final responsibility, but we will see that you are properly represented.

We had our present organization when this emergency came on, when the invasion of Korea started. We did many things in the Production and Marketing Administration before the Defense Production Act was passed and before the national emergency was declared. We simply absorbed that additional work, and I can say to you today that we have some 300 people less than we did last June and we are doing a bigger job today than we had to do last time.

I want to tell you the reason why we are able to do that. I don't take credit for it because the many fine people who are in that organization were in it during the last war. They came there from the old War Food Administration and we are simply a reshuffling of that organization and have been for some four or five years now. It was organized under the now present Senator Anderson who is a colleague of Senator Byrd in the Senate. We have the knowledge, we have the know-how, we have the experience of those people. Why shouldn't the responsibility for food mobilization be in that agency, just as your President Henry Taylor said? I think it is a logical place for it, too.

We have just announced the creation of an Industry Advisory Committee, a canner committee. If you don't already know the names of the people who are on it, I am sure those

of you who are appointed will receive letters from both the Secretary of Agriculture and myself about the operations of this committee. We will be calling you to Washington soon, under Si Smith, for the purpose of discussing any or all of your problems in connection with this industry. We want your advice, we seek your advice and counsel in doing this job, and it is through industry committees such as yours that we intend to work day and night in order to get the job done. So don't be surprised if we call on you, but we don't expect to call you unless we have something to discuss with you. I don't believe in taking the time of busy people to come to Washington unless we have a reason to consult with you, unless we can say something to you and you can give us your advice and counsel and go home feeling as though you at least got your point over. (*Membership of this Committee is listed on page 125.*)

Those are the things that we want to do, not only with this industry but with all industries. We will have a number of industry groups before this is over, but there again it will go right back to the commodity branch. We are coordinating these problems at my level but the commodity branch is the branch in the Production and Marketing Administration that is responsible for the technical operation of all of these programs.

We have had a number of problems and we are going to have a number more problems. I was not supposed to be here today but a little problem did come up that I came out here to talk with some of you people about. I am asking for your cooperation in solving that. I am asking for your cooperation in solving any and all of the problems that will come up later on. What we expect to do is to present the problems to your fairly and squarely as we see them. You will get a fair deal from us insofar as the government is concerned, so don't fail to tell us what you are thinking, what you believe, and how you think we should handle these problems. They are going to be numerous.

Established Trade Channels

As we go down the road ahead, there will be many shortages of things that we need, there will be many operations that will have to be curtailed, but I fully agree with Senator Byrd that the integrity and the solvency and most everything else in this country lies in the free enterprise system. We operate that way in the Department of Agriculture, we believe solidly in it, and for those of you who might have heard me speak before, I have always said that we believe thoroughly in operating through the established trade channels.

We don't want to do one job in our organization that can be undertaken and done by the trade. I think that in itself should give you a little bit of

the philosophy that we employ in trying to do the job. You know more about what you are doing than we know. If you didn't, you should not be in it. So we want your help, we want to draw upon you, because we are all in this boat together.

I think that our situation is serious. I don't think there is a person in the world today who will not realize how serious a time we are in, if he will just stop and think. I think the situation is extremely serious and how long it will remain so is anyone's guess, but I know that we are doing this: We are planning for the absolute worst and we are hoping for the best. If the present situation were to taper off tomorrow, we are ready to taper off with it. There will be many problems of adjustment, of course, but who wouldn't rather go through those problems than the ones that we would be faced with in getting ready for any eventuality that may come along?

The relationship between us and the other government agencies in Washington is very good. I am pleased that we have such men as Charles E. Wilson and Eric Johnston and General Harrison and Mike DiSalle and many others who have come in from industry to do this mobilization job. I think those people are going to have a tough time, but I think they are people who can mobilize the country if anybody can, and our relationship with them is good. Our relationship with the Quartermaster General is very good. I confer with General Feldman two or three times a week over the telephone, and frequently I am in his office or he is in mine. We are trying to coordinate the big procurement job on food that he has and the one that we finally will be responsible for. If we don't have sufficient foodstuffs, he can't do his job. If it isn't bought properly, then it makes our job harder. So, naturally, I am interested in seeing that we do the very best job that we know how.

Again let me say to you that it has been a real pleasure to be here. I would like to visit with you more. I had the opportunity of meeting with some of you in Washington not so long ago, but I want to say again that we have had a real year in working with your present President and we are looking forward to working with your new President and with all of the committees that your industry has set up. We work a good deal with Carlos Campbell and he is very fine and cooperative in everything that he can do to help. It is that type of help that we need across the board, not only from your industry but from all others. All we want to do is do the job that Congress has given us the responsibility for doing and I think we are well on our way.

SPECIAL PROCUREMENT SESSION

SUPPLEMENTAL REQUIREMENTS FOR CANNED VEGETABLES FROM THE 1950 PACK

By Brig. Gen. Everett Busch,
Commanding General,
Chicago Quartermaster Depot

My job is Commanding General of the Chicago Quartermaster Depot, located in Chicago on West Pershing Road. We have many varied activities at the Depot, perhaps the most important of which is found in our purchasing division. We purchase many things, but principally we buy all of the canned food products for the Army, Navy, Marine Corps, and Air Force. This would be a sizable job even if we had nothing else to do; however, its difficulty is lessened greatly by the fact that the canners association of America represents one of the most efficient, flexible, and co-operative industries with which we transact business.

It is customary for the Army to attend local, state, and national conventions of various industries on which it must rely for the bulk of its supplies. This plan has advantages which accrue both to the Army as buyer and also to industry, the supplier. Through the years, a tremendous amount of good will has been developed through these contacts which, from our point of view, has resulted in much benefit to all parties.

Therefore, the Chicago Quartermaster Depot was highly pleased when we were invited by Mr. Campbell, your able and obliging executive secretary, to attend your Convention.

We are fortunate in meeting not only with the many leaders of the canning industry itself, but this morning we feel particularly favored by the presence of representatives of several of the principal distributors of canned foods.

I feel highly privileged in being afforded this opportunity of addressing the entire team which is so completely represented in this assemblage; namely, the canners, the distributors, and the armed forces.

The eating habits of soldiers, whatever their nationalities, are developed in their homes. The American soldier demands something pretty close to the kind and variety of food his mother provided for him.

At permanent camps and stations at home and in the occupied areas of Germany and Japan, the soldier is fed the "A" type ration. This is a fresh food ration, much the same as one has on one's own table at home. In areas not provided with better cooking facilities and where refrigeration



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is lacking, and where supply lines are greatly elongated, the Army must use the "B" type ration. The "B" ration lacks fresh items, and full dependency is placed on canned foods, that is, canned meats, canned fruits, canned vegetables.

Where cooking facilities are totally lacking, such as in the forward areas of battle lines, in armored units which frequently are widely dispersed, or in the foxholes occupied by lonely and frequently scared youngsters, we then must resort to the so-called "packaged" or "operational" type ration. This is a very efficient ration and has enough calories, vitamins, etc., in it to keep an American soldier in good fighting trim for a full 24 hours. The armed forces again are facing conditions which call for a careful appraisal of facilities, depot reserves, and the filling of supply pipelines.

The Situation

I feel that it would be highly inappropriate for me to engage in a discussion of the causes and effects of the existing international situation. That is not the soldier's job. My knowledge of it is restricted to my own interpretation of newspaper, magazine, and radio accounts of what is said to be going on. As a soldier, however, I have certain very definite responsibilities to carry out in meeting the supply requirements of the armed forces.

The Korea incident, which began last June, immediately placed upon

the Quartermaster Corps the added responsibilities which inevitably attach themselves to active campaign. These responsibilities initially were met by stepping up production in various items and by borrowing, within the limits of availability, from depot reserve stocks.

The tide of events alternately ebbed and flowed. The situation naturally was not firm and the way ahead was not clear. The climax came on December 18, when a state of national emergency was declared. This, very considerably, cleared the atmosphere and raised the ceiling slightly above zero. The immediate responsibility of the armed forces in general, and the Quartermaster Corps in particular, were brought into bold relief. The objective, now that it can be seen, can be attacked with greater accuracy and confidence.

One of the immediate results has been the decision to expand our defense forces at home. This is a necessary and logical thing in the interest of our national security. The bitter winter campaign in Korea has called for additional troops for that area and has resulted in the consumption of an abnormal quantity of supplies of all kinds. Losses of some supplies on the battlefield always must be expected. This is inherent in combat.

The intensified conditions at home and abroad have combined to place upon the Quartermaster Corps demands for a modest increase in the requirements for canned fruits and canned vegetables from the 1950 pack.

I am asking the assistance of the canners and the distributors here assembled to cooperate with us, here and now, in finding the quantities of canned goods which we must have in order to feed our soldiers. My research into the quantities of the 1950 pack and their distribution convinces me that this can be easily and equitably accomplished. I firmly believe that this is a joint problem between the canners and the distributors, and I feel confident that the distributors will want to assist in good spirit in its solution. The distributors have, at this time, an abnormal accumulation of canned fruits and vegetables so that the public is assured of an ample supply. It is fortunate that there need be no anxiety on this point.

In a sense, this food requirement merely represents the quantities necessary to feed the young men who are being transferred from your communities to the training camps. Does it not appear logical that their share of 1950 cans be transferred with them?

The actual requirements for the armed forces at this time represent a limited number of items and call for only a relatively small percentage of the 1950 pack. For example, our requirements for canned snap beans represents barely 2 percent of the 1950

pack. Here are the actual number of cases—based in terms of 24 No. 2 cans—which the Quartermaster Corps needs to fulfill its requirements as the purchasing agent for the Army, Navy, Air Force, and Marine Corps:

Item	Unprocured balance (cases—basis \$1/6's)	Percent of annual pack 1950 (percent)
Asparagus	74,000	2
Lima beans	245,000	2
Snap beans	333,000	2
Corn	956,000	3
Peas	876,000	3
Spinach	57,000	1
Tomatoes	1,126,000	3
Tomato juice	615,000	2
Tomato catsup	279,000	2½
Tomato paste and purees	160,000	1/7 of 1

Extra Standard and Fancy grades are preferred but we will accept Standard grades to the extent necessary to fill our requirements.

Larger can sizes (10's, 2's and 2½'s) are preferred. However, we will accept smaller sizes when necessary.

We would prefer to stock with our usual styles and types in order not to complicate our worldwide supply system unduly. However, again we will deviate as found necessary to secure these supplies.

To speed up inspection, delivery, and payment we will accept the seller's certificate of grade on labeled merchandise as meeting either United States or commercial standards for the product concerned. No substandard items are desired. Compliance with food and drug laws is required.

While the quantities mentioned represent maximum possible substitutions—if we are to maintain an acceptable and palatable diet for your soldiers, sailors, and airmen—we will seriously consider offerings of items not mentioned if required to meet shortfalls on the items I have just furnished to you.

I would like to make it clear that the deviations being authorized in grades, can sizes, types and styles and so forth are only for the purpose of meeting our immediate needs and will not be permitted for 1951 pack procurement.

The Korean situation has imposed upon us special demands for certain items over and above what normally would be required for troops serving in America or Europe. The conditions which affect drinking water in Korea are extremely bad and therefore the requirements for canned fruit juices and liquids of all kinds which in any way act as a substitute for water are very heavy. Those who are accurately informed on conditions in Korea consider these substitutes necessary for maintaining the health of the troops. We intend, as the result of this special condition, to procure additional canned fruit juices, canned tomato juice if it can be obtained, and other liquids of this nature. It is probable that we will not be able to

obtain the full quantities of certain of these items from the 1950 pack; however, we believe you will agree that our sick and wounded soldiers in Korea should have a fair share of the available supply of these morale and health building juices.

Substitutions

We realize that we are coming before you pretty late in the season to obtain a perfect solution to these deficiencies. Realizing this, we have decided to modify our requirements as much as possible in the matter of can sizes and grades. Of course, we prefer the No. 10 can for about 70 percent of the requirements which we have to meet. Since this is out of the question at this time of the year, I want to emphasize to all present that the purchasing agents for the Quartermaster Corps will be glad to consider a reasonable variation in sizes and grades and I hope you will not hesitate to offer these to us providing you cannot furnish us with standard sizes and grades. We cannot, however, accept the entire quantities in odd sizes and grades, but we will cooperate to the extent possible.

Prices

The matter of prices is one in which we are all interested. Speaking personally and for my representatives from the Chicago Quartermaster Depot, we represent the United States government and we are keenly interested in obtaining the fairest price we can get. We also represent all taxpayers—you and I and all others. I ask your complete cooperation in this respect.

THE OVER-ALL SUPPLY SITUATION

By S. R. Smith, Chief,
Fruit and Vegetable Branch,
Production and Marketing
Administration, USDA

In appearing here this morning, I am doing so for the U. S. Department of Agriculture and to endorse in full measure the story which General Busch has just given you.

During the past week or so we have spent many hours with the folks in the Quartermaster General's office reviewing their needs and the problem at this stage to meet them. We feel firmly that there is a job to be done and can be done. That is our reason for joining with them at this time to bring the problem before the canning and the distributive industry. General Busch mentioned that this country does have a very comfortable supply of canned foods, only out of position as compared with what it is normally. Moreover, in studying the over-all supply position, we in the Department are convinced that the armed service needs can be met and supplying them to the QMC won't strain our

Depot Representatives

I have a number of purchasing and contracting officers here in the hotel assisted by a number of buyers. Our headquarters is located in room 22A on the fourth floor. If you will go to room 22A, you will find a depot representative who will assist you. We would like very much to contact all canners and all distributors. However, in view of the limitations of my staff, it will be impossible to do this. I therefore request that each of you contact my people in room 22A as soon as you possibly can and in any event before this Convention breaks up.

We believe that the most equitable solution to this problem can be had before you leave for home. We realize, however, that perhaps a few of you will find it necessary to get in touch with your home offices before you can make any offers. If you cannot do this before going home, I earnestly request that you contact us by telephone or telegraph as soon as you have been able to appraise your situation.

Conclusion

In ending this informal discussion, I want to thank you for your courteous attention and again to ask you for your cooperation in assisting the Army in making up these minimum, essential deficits of canned foods out of the 1950 pack.

We have presented you with the minimum problem, reduced to its lowest possible point. We feel that these requirements must be met if we are to support, in an adequate way, our growing defense forces.

regular distributive system. In other words, the long and short of it is that there is plenty for all.

I want to urge that you folks in the canning industry and the distributive industry search your minds, if you haven't done so, and find the way to get the job done. Moreover I want to address one special appeal to our friends, the distributors. When your canner-supplier contacts you and asks your cooperation in releasing some supplies that you have spoken for or have under contract, we solicit your cooperation in working with the canner so it will be possible for him to make his contribution to the Quartermaster's needs.

In the spirit and the fiber which characterizes the American canning industry, this is a small job for it to take on. If we in the Department did not think that you would address yourselves to this problem and would solve it promptly, I wouldn't be here this morning. We have that faith in you and I am sure you won't let the Quartermaster General or the Department of Agriculture down.

CANNING PROBLEMS CONFERENCES

DIETETIC PACKS IN THE NUTRITIONAL PROGRAM

By J. R. Esty, Director,
Western Branch Laboratory,
National Cannery Association

A program of study on the nutritive value of canned foods has been pursued by the canning industry since 1922 and a great many valuable contributions have been made, both by institutions leading in the field of nutrition and by industry representatives, so that there is available now a wealth of information on the chemical composition of canned foods and the important role they play in the human dietary. The most extensive program of research on canned foods was begun in 1941 under the sponsorship of the National Cannery Association and the Can Manufacturers Institute and is now in its tenth year.

Last September a book entitled *Canned Foods in Human Nutrition* was published by the Research Laboratories of the National Cannery Association, setting forth the results of recent research on canned foods, as well as presenting the background of events in the history of nutritional knowledge and a digest of that knowledge as it exists today. Of particular value are the tables giving the vitamin values for over 40 major products, the mineral content, protein, carbohydrate, fat and energy content of canned foods as they are being produced commercially and a translation of the basic results into terms of average servings.

In recent years there has been a notable increase in interest in the use of canned foods for dietetic purposes—that is, products packed in water or juice without adding salt or sugar—and it is expected that before long the volume of such foods will be large. Because of the importance of dietetic foods, and particularly of special unsalted foods for persons who are restricted by physicians to low sodium diets, in 1949, as a part of the N.C.A.-C.M.I. nutrition program, it was decided to conduct a survey of certain nutritive factors in such foods, including sodium and potassium, in order to provide usable dietary working data to persons trained to interpret and utilize the information wisely, and also to provide canners with technological facts concerning the effect of canning procedures on the sodium content of canned foods. It is well recognized that some canning operations incorporate sodium salts into the product. For example, in canning vegetables, it is universal practice to salt them to taste unless they are intentionally packed for special dietetic purposes. In canning peas, a salt brine separation is quite generally used to separate peas of differing ma-

turities. In peeling certain products, such as peaches and grapefruit, lye (sodium hydroxide) may be used, and to prevent discoloration of certain products, notably apples and pears, during canning they may be treated with a weak salt solution.

It is known that most foods are not entirely free of sodium, that the sodium content of a given food is somewhat variable, and that certain products contain naturally several times that of other foods. Since so many people are on low sodium diets these days, it was deemed important, therefore, that more definite information be obtained on the sodium content of foods. The significance of sodium in foods will be discussed by Dr. Bing, who follows me on this program.

Sampling and Analysis of Dietetic Packs

In the survey, an attempt was made to obtain samples representative of the products now commercially packed throughout the country in water or juice, without salt or sugar. The following products, totaling 150 samples from the 1949 pack, were included in this study:

Fruits: Applesauce; apricots; boysenberries; cherries, dark; cherries, sweet; figs; fruit cocktail; grapefruit segments; grapes; peaches, clingstone; peaches, freestone; pears; pineapple; plums, purple; and plums, Green Gage.

Juices: Grapefruit juice, lemon juice, orange juice, pineapple juice, and tomato juice.

Vegetables: Asparagus, green; asparagus, white; beans, green; beans, lima; beets; carrots; corn, white, whole kernel; corn, yellow, whole kernel; peas; spinach; and tomatoes.

Whenever possible, a representative of the N.C.A. Research Laboratories, the American Can Company or the Continental Can Company visited the canneries in order to supervise the packing details and collect the samples. When this was not practicable, samples were packed by canners, who were furnished with detailed instructions for their preparation. Although the samples were canned under controlled conditions in order to preserve uniformity, they can be considered to be typical of commercial dietetic packs. Pertinent canning and processing information was recorded at the time of packing on a sample record form for future reference. Information as to the source and treatment, if any, of the water used as the canning medium was also obtained.

The raw material used was chosen by the superintendent or canning forelady as being of fancy quality. Each lot consisted of 24 cans, and in most

cases the fill-in weight was adjusted so that all cans contained the same amount of product. In some cases where it was not practicable to remove or add small pieces of the food, for example, figs and unpeeled apricot halves, the actual weight of raw material in the can was recorded. The cans were filled with the water which would normally be used in preparing water pack products. The cans were run through the regular equipment, bypassing any salting apparatus. The cans were exhausted, closed, and processed according to the normal practice of the cannery. Six glass Mason jars of one quart capacity were filled with the same water used for the sample and this water was analyzed for sodium content.

Arrangements were made with the Wisconsin Alumni Research Foundation in Madison, Wis., to analyze the samples. Sodium and potassium were determined on the solid and liquid portions of each product, and in addition the percent of moisture, ash, ether extract, protein, crude fiber, and carbohydrates.

For most products the results are fairly conclusive and consistently show a low sodium content. With some products the sodium content is quite variable, but the variation can be accounted for by an inadvertent use of a sodium compound during canning. There are a few items on which abnormally high results were reported however, which cannot be explained at this time.

Summarizing our present knowledge of the sodium content of canned fruits and vegetables packed in water, with no salt or other sodium compound being added or coming in contact with the food so as to be carried over into final product, the following products were found to have a sodium content below 10 milligrams (mg) per 100 grams (g), and with a few exceptions these products had a sodium content of below 5 mg per 100 g:

Applesauce; apricot halves, unpeeled; asparagus, green; asparagus, green, tipped and white; beans, green; boysenberries; cherries; corn; fruit cocktail; grapefruit, segments and juice; grapes, Thompson seedless; lemon juice; orange juice; peaches, clingstone, halves or slices; peaches, freestone, halves or slices; pears; pineapple, slices or juice; and plums, purple.

In the case of figs, the sodium content of the samples tested varied from 6 to 20 mg per 100 g. Tomatoes and tomato juice were found to contain up to 35 mg of sodium per 100 g. The variation in these products was very great and the data are insufficient to draw conclusions. The sodium content of lima beans ranged from 5 to about 40 mg per 100 g, and that of peas varied from 4 to over 50 mg per 100 g. Spinach was found to average about 50 mg of sodium per 100 g and no results were reported exceeding

100 mg. The same applies to beets and carrots.

Influence of Certain Canning Procedures on Sodium Content

Lye Peeling—The cling peaches were lye peeled, but all of the sodium analyses showed that little, if any, of the lye was carried over into the final product. The sodium content of grapefruit segments, on the other hand, was affected somewhat by lye peeling. For example, fruit which was prepared by the removal of the peel and rag by cutting with a knife before the fruit was sectioned, and not treated in any other way, showed a sodium content of about 1 mg per 100 g, whereas fruit in the same plant, handled the same day, softened after peeling by a brief scald in hot water, then placed in a 2.5 percent lye bath at 190° F. for 30 seconds before rinsing with water showed a sodium content of 8.6 mg. Another sample from the same plant, which was placed in a 1.7 percent lye bath for 25 seconds, showed a sodium content of about 2.6 mg, and another sample packed at a different time and receiving the softening treatment and then peeled in lye, contained 2.7 mg per 100 g. In two other plants samples were collected which showed a sodium content of about 7 mg per 100 g, and in both cases the fruit was peeled with lye. In contrast to these data, the results on grapefruit juice showed the sodium content from six different plants to be not in excess of 2 mg per 100 g.

Treatment with Weak Salt Solutions to Prevent Discoloration—An outstanding example of this is in the canning of pears. The results of the sodium content varied from about 3 to 40 mg per 100 g in the four samples collected. The pears, having about 3 mg, were prepared and canned without treatment with a salt solution. The sample which was prepared from pears having a slight salt spray during canning showed a sodium content of about 10 mg. Another sample, receiving a fairly heavy salt treatment with inadequate water rinse afterward, showed a sodium content of about 40 mg per 100 g. In the case of fruit cocktail, the average sodium content of four samples prepared in four different canneries was about 7 mg, but in one case the product showed 10 mg. This may or may not indicate a little absorption of salt in one or more of the ingredients used.

Salt Brine Separation of Peas and Lima Beans—One of the samples of peas contained 104 mg per 100 g, which was three times the average sodium content of all the samples. In this case it was reported that the peas, which were very succulent and tender, were "floaters," indicating that a salt brine separation must have been used. In the case of lima beans, there was one lot which the record shows was separated in a 45° brine with plenty of washing, plus blanch after the separation. In this case the sodium con-

tent was 50 mg as compared with about half that figure for the average of the samples tested.

Water Treatment—With very few exceptions the sodium content of the canning water ranged from less than one to about 5 mg per 100 g. There were a few cases reported in which the water had been softened by the Permutit system and the evidence is quite clear that this results in some increase in the sodium content. In one lot which the record shows was separated in a 45° brine with plenty of sodium content was twice that of the samples canned with untreated water. In one sample of corn canned with Permutit-treated water, the sodium content was about seven times that of the other six samples. These results indicate that the sodium content may be materially affected by the treatment given the cannery water supply.

Other Possible Factors—There is reason to believe that blanching or preheating certain products may alter the sodium content and this needs further investigation. There may be other practices or special treatments in use in canning certain products which may increase the sodium content of the canned product. Therefore, in producing foods in which low sodium is an important consideration, canners should take special precautions to ensure that no sodium is added during canning operations.

Further Work in Progress

The committee administering the nutrition program has decided to continue this study to obtain data on additional samples of the same and other products in order to have more information available concerning the sodium content of dietetic packed foods. The following new products will be included in this study:

Apple juice	Potatoes, sweet
Apples	Potatoes, white
Blackberries	Prune juice
Grapefruit and orange blend	Raspberries
Mushrooms	Strawberries

Labeling Requirements

At the present time there is considerable confusion and some abuse concerning the use of the word "dietetic" on the label, without explanatory material. The U. S. Food and Drug Administration is greatly interested and intends to see to it that dietetic foods are properly labeled. The American Medical Association Council on Foods is also vitally interested and requires definite information as to the composition of foods which are to bear the AMA Seal of Acceptance. It seems timely, therefore, with the new knowledge now available, for canners to give attention to these matters. Otherwise, there is a chance that the industry may not profit fully from what now appears to be an excellent opportunity for expansion. The Nutrition Committee has taken steps to discuss these findings with U. S. Food and Drug officials and the Council on Foods of the American Medical Association, and will try to reach an understanding concerning labeling requirements.

Summary

Generally speaking, from data now available, canned salt-free vegetables and water pack or juice pack fruits can be considered useful for persons whose diets are restricted to low-sodium foods and to those who are interested in dietetic foods because of their low carbohydrate or caloric yield. From the standpoint of low-sodium content, canned fruits packed in sugar syrup fall in the same range as those packed in water or juice.

Each producer should have his products checked from time to time to ensure that the label statement is valid. It must be kept in mind in this connection that the analysis of a single can or a few cans taken at random would not give satisfactory values, but for analysis a representative sample should be selected in order that the results might be considered typical for a particular pack.

NUTRITIONAL ASPECTS OF LOW-SODIUM DIETS

**By Franklin C. Bing,
Nutrition Consultant and
Lecturer in Physiology**

There has been increasing medical interest in the last several years in low-sodium diets for therapeutic purposes. A continuing demand for processed foods that are suitable for use in such diets exists. These facts indicate that a discussion of the behavior of sodium compounds in the body may be useful as background information to manufacturers interested in the production and marketing of low-sodium foods.

At one time low-sodium diets were commonly referred to as "salt-free" diets. The older expression "salt-free"

should be abandoned in favor of the more precise term, which properly places emphasis on the sodium part of sodium chloride. It also helps to avoid any misunderstanding about the recognized value of salt in the diet.

It is true that the principal dietary source of sodium is ordinary salt, with which man has flavored his foods since time immemorial. Both the sodium and the chloride parts of ordinary salt are necessary for life. The usual intake of salt provides a liberal allowance in excess of the requirements of the body. When considerable sweating occurs, however, more salt than is usually consumed may be needed to compensate for the greater losses through the skin. The giving of salt

tablets, or slightly salted drinking water, is a practical solution to this occasional need for greater salt intakes.

The fact that significant amounts of salt are present in sweat provides a hint for the understanding of the physiological importance of salt to the body. For all body fluids contain salt, and the salt of the body exists in solution. When fluids are lost from the body, by excretion or otherwise, salt is lost, and both salt and water may be needed to replenish the body's supply.

The Physiology of Sodium

The sodium content of the body has been estimated to be about 65 grams, of which about 9 grams is present in the plasma of the blood (1). The remaining sodium is present as the sodium ion in all the rest of the body fluids, except gastric juice, where it is replaced by the hydrogen ion. Other ions are also present in the body water, but in the so-called extracellular fluids which provide the media in which all our tissues are immersed, the sodium ion is the most abundant of the basic elements.

Now it is a fundamental concept of physiology that the body strives to maintain a constant composition of its fluids. The precision with which this task is performed, in health, is remarkable. The usual sodium intake from all sources is about 5 grams. Each day the average adult thus consumes about half as much sodium as is present in the plasma of the blood. All is absorbed and, as a rule, within a few hours all is excreted. If the sodium ion concentration of the blood plasma were to become markedly increased, there would be a withdrawal of water from the tissue cells because of the alteration in osmotic pressure. This does not occur, because the absorbed sodium ion is stored temporarily in a concentration which is in osmotic equilibrium with the cells. The principal storage place is in the spongy connective tissues of the body, especially those beneath the skin. From these temporary storage places the sodium ion, with its accompanying water, is withdrawn as excretion occurs.

It is only when exceedingly large amounts of salt are consumed, such as 35 or 40 grams, that the normal excretory mechanisms show signs of difficulty in handling the burden. Then it is that sodium tends to accumulate in the body, and the water in which it is dissolved forms the so-called edema fluid. Under ordinary conditions, in health, the excess of sodium ions is readily excreted.

By far the greatest amount of sodium is excreted by way of the kidneys. A variable amount is excreted in the sweat and a small amount is eliminated by way of the intestines. Whenever the loss by the skin or intestines becomes greater, the amount excreted by the kidneys becomes cor-

respondingly reduced. The kidneys then may be considered as the machinery by which the body regulates the normal sodium content of the body fluids.

In recent years the functioning of the kidneys in regulating the sodium content of the body fluids has become fairly well understood (2, 3). The sodium is in solution, in the plasma, which is pumped to the kidneys by the heart. The functional unit of the kidneys is a unique filtration-reabsorption apparatus of microscopic size. There are about one million of these units, or nephrons, in each kidney. In many respects each nephron resembles a tiny funnel, the head of which contains a unique network of capillaries surrounded by a very thin membrane, and the long stem of which is surrounded by special cells. Water and many dissolved materials pass from the blood plasma through the capillary network, which is called a glomerulus. This glomerular fluid passes down the stem or tubule of the funnel-like structure, and eventually is excreted as urine. Changes occur in the composition of the filtrate as it passes through the tubules, some materials being absorbed into the cells and thus returned to the blood stream, and other soluble substances being excreted through the tubule cells and added to the urine.

The studies which have contributed to the modern understanding of the work of the kidneys make a fascinating chapter in the story of physiology. For present purposes it must suffice to accept the conclusions without discussing the great amount of painstaking work which has led to their development. The prevailing views about the excretion of sodium may be summarized as follows:

Every 24 hours the kidneys filter about 180 liters of fluid from the blood plasma. This filtrate contains the sodium ion at about the same concentration as exists in the plasma. In its passage through the tubules much of this fluid is reabsorbed. Because the volume of urine is from about 1 to 2 liters, the remaining 178 or 179 liters of glomerular filtrate must be reabsorbed during the passage through the tubules. Evidence indicates that more than 99 percent of the sodium ion also is reabsorbed. This means that in order to eliminate 5 grams of sodium ion the kidneys must filter 500 grams, of which 495 grams subsequently are reabsorbed.

It seems like a cumbersome way of handling the problem of maintaining the concentration of the sodium ion in the body fluids, but as Professor Gamble has written, the system works "with a beautiful accuracy."

Significance of Different Sodium Levels of the Diet

The reabsorption of the sodium ion in large measure appears to be controlled by the action of the glands of

internal secretion. The administration of salt is helpful in the management of adrenal insufficiency, as in Addison's disease. The restriction of salt often has been found to be beneficial in a number of conditions where there is a tendency for the retention of fluid in the body. This may be the case in certain diseases of the heart, notably congestive heart failure, and in the nephrotic type of kidney disease.

Restriction of the salt intake in the treatment of hypertension was proposed by French physicians over 40 years ago. In this country Allen in 1922 reported a striking improvement with low-sodium diets in a large number of patients, but the reports of other investigators were not favorable, perhaps because the requirements of the low-sodium diet were not clearly defined. Interest in the subject was intensified in 1944 with the report of Kempner (4) of the dramatic reduction in blood pressure in hypertensive patients and the relief of associated symptoms with the so-called rice diet.

The rice diet is composed of cooked rice, fruits, juices and sugar, supplemented with vitamins and iron. It is essentially a very restricted diet, very low in sodium content. The diet is also low in fat, protein and calories. It is unsuited for prolonged treatment, because of its unpalatability and because of its nutritional deficiencies. Patients who have been continued on the rice diet for long periods of time have been in negative nitrogen balance, which in time may be serious.

Many efforts have been directed toward improving the nutritional values of the rice diet, while retaining its essential feature, the low-sodium content (5, 6, 7). Restriction in calories is also considered in itself to be advantageous in the management of hypertensive patients.

Nutritionally adequate low-sodium diets have thus come to assume a recognized place in the dietary management of a number of disease conditions: hypertension, congestive heart disease and certain kidney disorders associated with a tendency toward edema formation. Some other conditions where low-sodium diets have been tried, with varying success, are in the management of Meniere's disease, obesity of children, certain allergies and skin diseases, and in toxemias of pregnancy. Further study no doubt will reveal more information about the uses and limitations of low-sodium diets in these and in other conditions.

In a survey made in 1949 with the cooperation of the hospital dietitians in the Chicago metropolitan area, we attempted to find out how many of the patients hospitalized at the time were receiving low-sodium diets (8). There were 45 hospitals reporting, with a total bed capacity of 18,717 and with an average census of 14,551 patients. Exactly 6.0 percent of these

patients, or 872, were receiving low-sodium diets. The percentage in the various institutions, which were general hospitals with a capacity of 100 or more beds, was from 1.7 percent to 22.8 percent. These figures are impressive. The survey has not been repeated, but limited inquiry has indicated that the use of low-sodium diets continues to gain acceptance in the medical management of patients not only in hospitals, but also of patients under medical treatment but living useful lives in their communities and living at home. It must be remembered that many persons hospitalized and placed on low-sodium diets are greatly improved and, on discharge from the hospital are obliged to remain on low-sodium diets for the rest of their lives. The potential market for low-sodium foods may be conservatively estimated to be about equal in magnitude to the market for canned, strained and chopped foods for infants and small children.

Low-sodium diets are now formulated on the basis of the total amount of sodium permitted each day. As a rule there are three levels of restriction, depending on the needs of the patient and the judgment of the attending physician.

The unrestricted diet usually provides from about 4 to 8 grams of sodium. The elimination of salt in the kitchen and at the table, and the avoidance of a relatively few highly salted foods, will reduce this intake to from 1.5 to 3.0 grams daily. This represents the level of sodium intake for a mildly restricted diet.

Moderate restriction of sodium to a level of from 0.5 to 1.5 grams daily requires the elimination from the diet of many processed foods which are flavored with salt, such as canned vegetables, and also the avoidance of certain foods which are naturally high in sodium content.

A severely restricted low-sodium diet provides less than 0.5 gram of sodium daily. Diets may be prepared with less than 0.2 gram of sodium daily. Such low levels of sodium intake require rigid supervision, and particular attention to the condition of the patient, for it must always be borne in mind that sodium is essential to life, and cases have been reported of circulatory collapse and uremia from too rigid exclusion of sodium from the diet.

The Massachusetts Heart Association recently has prepared an excellent booklet for patients, entitled "The Cook Book for Low Sodium Diet," by Reena Roberts Haaker (9). The preface asserts that a low-sodium diet need not be a poor compromise with good eating. Mrs. Haaker includes many suggestions in her recipes for making low-sodium dishes more acceptable through the judicious use of acceptable flavorings and spices in place of salt.

The Need for Low-Sodium Foods

From the practical point of view, the food industry can contribute to this field of dietary therapy by making available processed foods that are palatable, economical, easily available to persons who need them, and which are of known sodium content. If the sodium content is declared on the label, preferably in terms of milligrams of sodium per 100 grams of food, then the physician and the dietitian can make use of the information in the formulation of diets. Fortunately, reliable methods of determining the sodium content of foods are now available; the use of the flame photometer on a solution of the dry ashed sample is capable of giving accurate results. The most extensive compilation of data on the sodium content of foods, obtained with the use of the flame photometer, has been reported by Bills and his collaborators, in the research laboratory of Mead Johnson and Company (10).

The sodium content of individual items varies; as a general rule the processing of foods increases the sodium content. Salt may be added, or some other sodium salt used in the processing. Many canned fruits and fruit juices, however, are sufficiently low in sodium to be useful in even the most restricted diets. Indeed, fruits and fruit juices usually are recommended in greater quantities in low-sodium diets than in normal diets. Canned unsweetened fruits and fruit products should be particularly useful in low-sodium diets, not only because of their low content of sodium, but also because of their lower calorie content as compared to the products made with added sugar.

Most canned vegetables and many of the frozen vegetables are not suited for use in low-sodium diets because of the salt added in their processing. This higher sodium content may be owing to the use of salt tablets in the canning process, or it may arise from the use of the brine flotation process for sorting peas. Water-packed canned vegetables have a sodium content that approximates the composition of the fresh vegetables from which they are prepared. Here again, to be most useful to the dietitian, physician and patient, the sodium content should be determined, and declared on the label.

Foods from animal sources, such as meats, eggs, milk and milk products, contain appreciable quantities of sodium even when no salt is added. Milk contains about 50 mg of sodium to each 100 grams; a pint would provide almost 0.5 gram of sodium. For severely restricted diets, milk must either be used sparingly, or a specially prepared product, low in sodium, substituted for it. One product is commercially available; the sodium has been almost eliminated by the use of synthetic exchange resins, so that the reconstituted low-sodium milk provides only 1 mg of sodium per

100 grams, or less than 5 mg per pint. A low-sodium canned tuna is now available; it contains 70 mg of sodium per 100 grams, as compared to 800 mg of sodium per 100 grams of ordinary canned tuna. All of these special products make it possible for the patient on a restricted sodium diet to secure animal protein foods that are specially designed for his needs.

Formulated products tend to run high in sodium. The formula for ordinary bread, for example, calls for salt, and bread contains over 600 mg of sodium per 100 grams. Bread made without added salt contains 28 mg or less. There are now canned low-sodium breads, and even cake, which are of good eating quality and which are remarkably low in sodium content. Canned soups, of course, tend to run high in sodium, because of the use of salt as a seasoning. Recently some canned low-sodium soups have made an appearance; they should be a welcome addition to the diet of patients on controlled sodium intakes. The development of commercial products that are low in sodium, and are also acceptable from the palatability viewpoint, presents a real challenge to the food industry.

The question sometimes arises whether salt substitutes should be added to canned vegetables or other products which are low in sodium. In the case of commercial foods this does not seem to be particularly desirable at the present time. There are a number of salt substitutes available to consumers, usually products containing potassium chloride and the hydrochloride of an amino acid, and one of these can be used by the patient, if he desires, and if his physician so recommends. It is noteworthy that many patients on low-sodium diets become accustomed to the unusual blandness of their diets, and complain of little craving for salt.

In the last year or two some reports have appeared of therapeutic trials of synthetic resins by mouth, for the purpose of combining with sodium in the intestinal tract and thus reducing the sodium intake. These measures may prove to have some usefulness, probably in connection with the giving of low-sodium diets, but it is considered unlikely that the use of synthetic resins to remove sodium from the intestinal tract will supplant the use of low-sodium diets.

In the survey of hospitals in the Chicago area, to which reference has been made, the question was asked about the processed food items which the dietitians considered most desirable for use in the preparation of low-sodium diets. Out of 45 returns, low-sodium bread products were mentioned 33 times, and other bakery products 26 times; canned water-packed vegetables (no salt added) were mentioned 19 times; and low-sodium soups, including soup bases, broths, broth bases and cream soups, 16 times. After the foregoing items,

the following foods were mentioned as desirable items, the list being in the order of the number of times mentioned: low-sodium salad dressings and mayonnaise, prepared desserts, canned juices, cheese and dry cereals, followed by a miscellaneous group which included canned meats, canned fish and luncheon meats, ice cream and peanut butter. It is interesting to note that since 1949 many of these products have become commercially available. The Council on Foods and Nutrition of the American Medical Association gives consideration to products intended for use in low-sodium diets, and has accepted a number of products.

It is evident that the food industry, and especially the canning industry, is performing a most useful service in making these low-sodium foods available for those persons who need them.

Summary

1. Salt is a necessary component of the diet, although ordinarily much more is consumed than is needed to meet body requirements for sodium or chloride.

2. The elimination of sodium requires work by the heart and kidneys.

3. Restriction of the sodium intake is useful in the dietary management of certain diseases of the heart, circulatory system and kidneys, and probably in other conditions.

4. To be useful for inclusion in low-sodium diets, the sodium content of each processed food product should be labeled, in terms of mg of sodium per 100 grams of the food.

5. The use of various flavoring agents, for processed foods low in sodium, could well be explored, for the purpose of further improving the palatability of these foods.

6. The potential market for low-sodium foods is thought to be about equal in volume to the present market for canned strained and chopped foods for infants and small children.

Bibliography

- (1) Shohl, A. T. *Mineral Metabolism*, New York, Reinhold Publishing Corp., 1939.
- (2) Smith, H. W. *The Physiology of the Kidney*, New York, Oxford University Press, 1937.
- (3) Gamble, J. L. *Chemical Anatomy, Physiology and Pathology of Extracellular Fluid. A Lecture Syllabus*, Boston, Department of Pediatrics, the Harvard Medical School, 1942.
- (4) Kempner, W. "Treatment of Kidney Disease and Hypertensive Vascular Disease with Rice Diet," *North Carolina Med. J.*, 5: 125-133 (1944); 6: 273-274 (1944).
- (5) Landowne, Milton. "The Low-Sodium Diet in Vascular Disease," *J. Am. Diet. Assoc.*, 24: 187-198 (1948).
- (6) Currens, J. H. "Dietary Treatment of Hypertension," *J. Am. Diet. Assoc.*, 25: 315-317 (1949).
- (7) Stare, F. J., Jr. and Kahn, I. S. "Nutrition in Medicine," *Annual Review of Medicine*, 1: 127-152 (1950), Stanford, California, Annual Reviews, Inc.
- (8) Bing, F. C., Freeman, Smith, and Pilcher, R. W. "Survey of the Use of Low-Sodium Diets in General Hospitals of the Chicago Metropolitan Area," unpublished report, 1949.
- (9) Hasker, Rosina R. *The Cook Book for Low Sodium Diet*, Boston, The Massachusetts Heart Association, Inc., 1950.
- (10) Bills, C. E., McDonald, F. G., Niedermeier, W., and Schwartz, M. C. "Sodium and Potassium in Foods and Waters. Determination by the Flame Photometer," *J. Am. Diet. Assoc.*, 25: 304-314 (1949).

EFFECT OF STERILIZATION TEMPERATURES ON COLOR OF TOMATO JUICE

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Introduction

Since the advent of commercially canned tomato juice, canners have encountered sporadic but frequent outbreaks of spoilage caused by the survival of comparatively heat-resistant organisms, of which some strains of *Bacillus thermocacidurans* are the most heat-resistant. Spoilage caused by this organism is characterized by a bitter off-flavor and no appreciable gas production. Although the spoilage has not been extensive in many instances, serious economic losses have resulted due to the difficulty of segregating these cans from large lots of unspoiled goods, since it is impossible to detect this type of spoilage without opening the cans.

During the intervening years, several methods have been suggested for controlling this type of spoilage, such as meticulous plant sanitation, redesigning of processing equipment and

boiling water processes for destroying some of the lower heat-resistant strains. These measures have aided materially in reducing the incidence of spoilage, but none have been completely capable of eliminating it.

Adequate thermal processing, in conjunction with good housekeeping, is the best means for controlling spoilage caused by these organisms. However, effective thermal processing is not feasible with the conventional boiling water processes common in the tomato juice packing industry, because the drastic heat treatment necessary to destroy the spores of some strains of *B. thermocacidurans* would adversely affect the juice quality.

A method of high temperature short-time flash presterilization of juice was introduced to the industry some 10 years ago, whereby it was possible to destroy heat-resistant organisms without adversely affecting the quality of the juice.

Briefly, this method involves the rapid heating of juice to temperatures high enough to destroy *B. thermocacidurans* followed by rapidly cooling

to about 200°F., filling into the cans, closing, inverting and holding for one to three minutes, and then water cooling. This method of presterilization has been widely accepted, and within the last five years a large number of canners have installed equipment for the presterilization of tomato juice.

At this point, the canning of tomato juice would seem to have resolved itself into a successful and well established operation. However, the advent of flash presterilization has introduced another problem—namely, the effect of this method of sterilization on the color of the juice.

Studies in 1948

During the 1948 tomato juice canning season, attention was called to three instances where canners in widely separated geographical locations noted that the color of flash sterilized tomato juice was significantly inferior to tomato juice processed by conventional methods. From a critical examination of these reports, the following deductions were made:

(1) In all instances the raw product was of borderline fancy quality.

(2) The flash sterilized juice failed to meet Grade A color requirements immediately after canning, whereas conventionally processed juice of the same lot did meet these requirements.

(3) Upon regrading several weeks later, the flash sterilized juice met Grade A requirements for color, and at that time very little difference was noted between the color of the flash sterilized and the conventionally processed juices.

In order to substantiate these deductions, a test pack of tomato juice was made under controlled commercial conditions during the 1948 season. For this experiment, a four-hour supply of tomatoes was obtained, wherein special care was exercised in obtaining a uniform borderline fancy raw product. This was not particularly difficult, since it was quite late in the season. Preparation of the raw juice was then made on a conventional juice line. The raw stock was divided into four lots, one for each variable, and treated in the following manner in a large tube sterilizer:

Lot 1 was flash sterilized at 250°F.

Lot 2 was flash sterilized at 255°F.

Lot 3 was flash sterilized at 260°F.

Lot 4 was heated in the flash sterilizer to 208°F. prior to filling, and served as the control sample.

After presterilization and cooling the flashed samples were filled into cans at about 206°F., closed, rolled on their sides for three minutes, and then spray-cooled. The control samples were filled into cans at 202°F., closed, inverted, and held for 10 minutes, after which the cans were cooled by water immersion. The heat treatment given the controls was not suffi-

cient to destroy any contamination due to *B. thermocidurans*. All variables were canned in plain 404 x 700 cans. In this experiment there was no way of adjusting holding times in the particular flash sterilizer employed; consequently, equivalent sterilizing values for each processing temperature could not be obtained. The hold time for this unit was held constant at 60 seconds, whereas actual calculated holding times for a sterilizing value of 0.7 would have been 42 seconds for 250°F., 22 seconds for 255°F., and 11.4 seconds for 260°F. As a result, the heat treatment was somewhat more severe than would be required for the destruction of *B. thermocidurans*, and was particularly severe in the 260°F. process.

Color Differences

A visual examination of the samples was made the following day at which time the control sample was significantly better with respect to color than those samples which had been flash sterilized. However, even though the 250°F. sample received a more severe heat treatment than was necessary, it was only slightly inferior to the control sample. Both the 255°F. and 260°F. processes were definitely poorer in color.

After one week's storage, the best color was observed in the control sample, but the sample flashed at 250°F. was also very good. Many observers could not detect a difference, and some actually preferred the flash sterilized sample. The samples processed at 255°F. and 260°F. were still significantly inferior, although the differences were not quite as pronounced as was noticed in the first cutting a day after processing.

At one month, all samples showed a general improvement in color. In this instance, the control sample and that sterilized at 250°F. were very nearly identical in color, as was supported by disk colorimeter comparisons. Both samples met qualifications for fancy juice. The samples sterilized at 255°F. and 260°F. did not meet the qualifications for fancy juice, although the 255°F. sample was very close.

After 2½ months' storage, there appeared to be a general decrease in color values of the samples, and there was less difference between all of the groups. The control sample and that flash sterilized at 250°F. were still very nearly identical in color. The 255°F. sample was closer to the 250°F. sample than it was at one month, although it still did not meet fancy color qualifications. The 260°F. sample was still the poorest.

This experimental work did substantiate some of the original contentions in that a flash sterilized borderline fancy grade of juice would not meet fancy qualifications immediately after canning, whereas the conventionally processed juice did; and fur-

ther, the color of the juice upon storage improved and compared favorably with that of the conventionally processed juice.

It is interesting to note that color-wise very little heat treatment at these elevated temperatures over and beyond that required for the destruction of *B. thermocidurans* can be tolerated by the juice. From this, it would seem that it is imperative for a flash sterilizer operator to hold both the flow rates through the system and the sterilizing temperatures as constant as possible. Furthermore, for a particular unit, the hold time for a given temperature should be known, and this time-temperature relationship should not exceed the sterilizing value necessary to destroy *B. thermocidurans*.

Although this experiment served its intended purpose, it left some very pertinent questions unanswered, such as:

(1) What effect would various sterilizing temperatures have on the color of borderline fancy juice, if the time-temperature relationships were such as to give an equivalent sterilizing value of $F = 0.7$ for each of the sterilization temperatures?

(2) How does flash sterilization affect the color of fancy juice?

In order to answer these questions a series of laboratory experiments were conducted during the 1949 season.

Pilot Plant Experiments

A small pilot line for packing tomato juice was installed attempting to duplicate as closely as possible the time cycles for each operation as carried out in the average cannery. This line consisted of a comminuter, preheating tank, paddle-type finisher, holding tank, high pressure sanitary pump, and a tubular sterilizer, all of stainless steel construction. The tubular sterilizer was of a high velocity small tube design, using ¾" diameter tubes mounted in steam jacketed tube nests. The flow rate used for this unit was maintained constant at 106 gal./hr. and the diameter and lengths of the holding tank sections were so designed that equivalent sterilizing values for each of three sterilization temperatures were obtained for the flow rate used. As closely as it was possible to calculate, the sterilizing value used in these tests was $F = 0.7$. Sterilization temperature measurements were made with the use of Weston bi-metallic thermometers which were inserted in the product line. Cooling to the desired filling temperature was effected in an annular space cooler mounted adjacent to the sterilizer.

For the first series of experiments, two lots of Garden State variety tomatoes, one of borderline fancy quality and the other of standard quality, were obtained from a large cannery in the Illinois area after the grading,

FIGURE 1

Flow Diagram

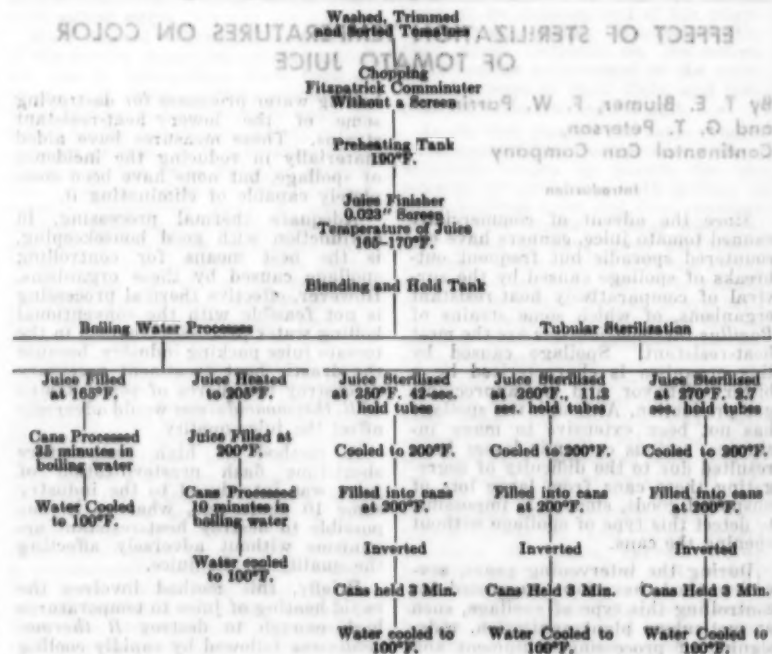


TABLE I
Visual Examination of Color* in Tomato Juice
Processed by Various Methods

Code	24 hrs. after Processing	One Week	Two Weeks	One Month	Two Months	Three Months
10 F	27	25	25	27	27	29
35 F	28	25	25	28	27	29
50 F	29	25	27	26	27	28
60 F	29	25	27	26	27	28
70 F	28	25	26	26	27	28
10 S	24	23	25	25	26	28
35 S	23	23	25	25	26	28
50 S	23	24	23	23	26	27
60 S	23	24	24	24	26	28
70 S	23	25	24	24	26	27
10-3	30	29	27	28	..	..
35-3	30	28	27	28	..	..
50-3	28	25	29	28	..	..
60-3	29	28	29	26	..	..
70-3	29	28	28	26	..	..

* PMA Grading Standards: Fancy—26-30 points. Standard—23-25 points.

washing, sorting and trimming operations had been completed and the tomatoes were ready for chopping and preheating. About one month later, fancy Rutgers tomatoes were obtained from a cannery in Indiana and used as the third and final grade variable in these experiments. In the coding system employed, the letter "F" denotes the borderline fancy grade, "S" denotes the standard grade, and "3" refers to the fancy grade.

The flow diagram shown in Figure 1 illustrates the experimental procedures and the several variables employed which included two boiling water process controls and three flash sterilized samples.

The wash, trimmed and sorted tomatoes were chopped in a comminuter (no screen). The chopped tomatoes were then preheated to 190°F. and immediately sent through a paddle-type finisher which was equipped with a .025" screen. The finished juice was then transferred to a reservoir tank where all the juice from the finisher was blended. The temperature of the juice in the tank was between 165 and 170°F. The raw stock in the blending tank was divided into five lots, one for each variable and treated in the following manner:

- (1) Lot 1 was canned at 165°F., closed, processed in boiling water for 35 minutes and cooled by water immersion to 100°F.
- (2) The juice in Lot 2 was heated to 205°F., filled at 200°F., closed, processed in boiling water for 10 minutes and cooled by water immersion to 100°F.
- (3) Lot 3 was flash sterilized at 250°F. for 42 seconds.
- (4) Lot 4 was flash sterilized at 260°F. for 11.2 seconds.
- (5) Lot 5 was flash sterilized at 270°F. for 2.7 seconds.

Subsequent handling of the juice for the last three lots was the same, wherein it was cooled to 200°F., filled into the cans, closed, inverted, held for

3 minutes, and cooled by water immersion to 100°F.

All samples were packed in plain No. 2 cans.

This entire packing procedure was repeated for each of the three grade variables.

The number prefix in the coding system employed denotes the process. The figure "10" signifies a 10-minute boiling water process; "35" signifies a 35-minute boiling water process; and "50", "60", and "70" denote flash sterilization temperatures of 250, 260 and 270°F., respectively.

Examination for Color

All variables were examined for color 24 hours after packing, at one week, two weeks, one month, two months, and three months. In addition to this, raw samples were taken from the blending tank and used for initial color comparison standards.

The true evaluation of color in a food product is relatively difficult. Standards for judging color in tomato juice generally include both visual and disk colorimeter examinations. Visual and disk colorimeter examinations depend, to a large extent, on the proficiency of the observer and his sensitivity to the color being observed at a given time. As a consequence, a method of objectively measuring color was introduced in these studies as a check on the visual and disk colorimeter evaluations by the use of a General Electric Recording Spectrophotometer.

Before discussing the results of these color examinations, it would be well to consider the relative merits of the three methods employed for color evaluation insofar as our particular problem is concerned. As might be expected, the visual examination was somewhat erratic, although a critical examination of these data does show some interesting trends. The disk colorimeter data were also quite erratic, but they were discarded only

because it was found later that the operator could not consistently check himself on duplicate samples.

The G. E. Spectrophotometer data were more consistent than those obtained from the other two methods because the instrument measures color in an objective manner. However, the spectrophotometer has not been evaluated to a point in these studies where the results obtained from it can be correlated with visual grading in every instance. Conclusions based on spectrophotometric results must be evaluated with these qualifications in mind.

Since the G. E. Spectrophotometer is a relatively new instrument in this field, it would be well to briefly outline the methods used in evaluating color with this instrument.

In this instrument a light source is used which radiates all portions of the visible spectrum. The spectrum is continuously scanned and the reflectance of the sample is measured in comparison to a standard white. The difference between the sample and standard is picked up by a phototube and transferred to a recording pen which plots the reflectance of the sample throughout the entire spectrum. The curve so obtained is independent of the light source.

The Spectrophotometric curves obtained on the instrument were integrated in the usual manner with respect to Illuminant "C" (average daylight). These integrated results were converted to Munsell Renotation values. (1)

In order to obtain a color difference measure between samples a color difference index (I), from a formula given by Judd (2) was used wherein hue was weighted high in comparison with value and chroma, since hue differences are of more importance than the others in color grading of tomato products. This system was employed because of its greater clarity and simplicity for purposes of calculation and presentation.

The G. E. Spectrophotometric data presented herein will be confined to (I) values which show deviation of the color of the sample in question from the original raw juice standard. By doing this, a simple numerical relationship expressing color differences can be shown.

Color Ratings

Although some discrepancies are evident in Table 1, in general, juice originally expected to be borderline fancy in quality was visually graded within the fancy range throughout the entire examination, irrespective of the processing treatment (Lot F).

As far as the standard juice was concerned, it was initially graded as standard, but apparently exhibited a marked improvement in color on

storage, also irrespective of the processing treatment (Lot S).

The fancy grade of juice was graded high in the fancy range initially, and it remained in this category throughout the examination period (Lot 2).

It is of greater importance to note that there was little or no visual color differences for a given exami-

nation period between conventionally and flash sterilized juice when equivalent sterilizing values were employed.

Figure II shows the index of fading (I) plotted against process based on spectrophotometric data for the borderline fancy tomato juice group. The other two groups, standard and fancy, exhibit the same trends and are not included in this paper.

FIGURE II
Effect of Processing on the Color of
Borderline Fancy Tomato Juice

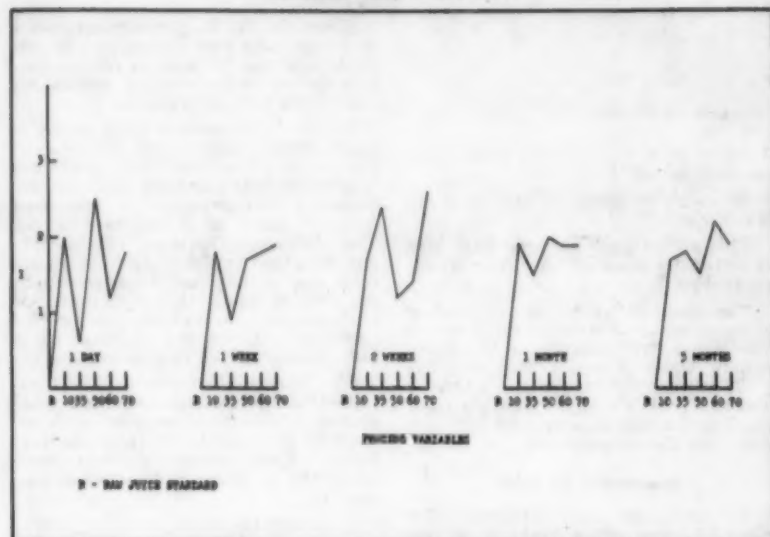
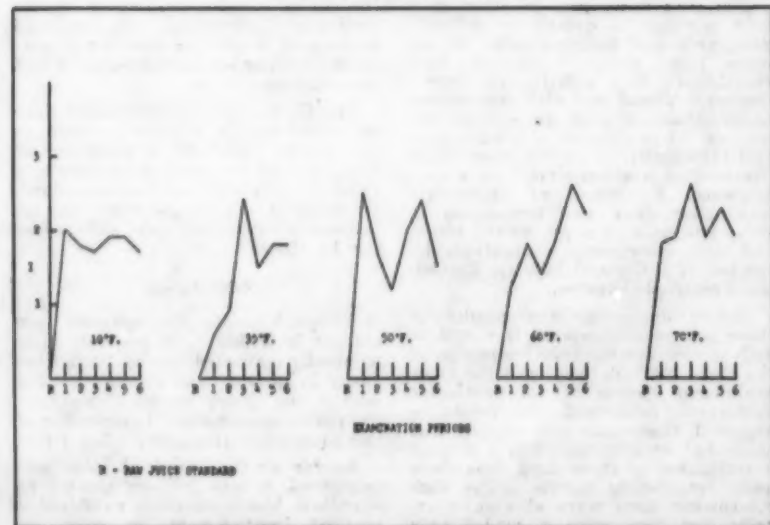


FIGURE III
Effect of Storage on the Color of
Borderline Fancy Tomato Juice



Examination of the graphs presented in Figure II indicates that the various methods of juice processing produce significant color differences. It is evident from these curves that color deterioration takes place to about the same degree in thermal processed tomato juice irrespective of the type of heat treatment. There is no evidence here to indicate that flash sterilized juice is inferior in color to conventionally processed juice.

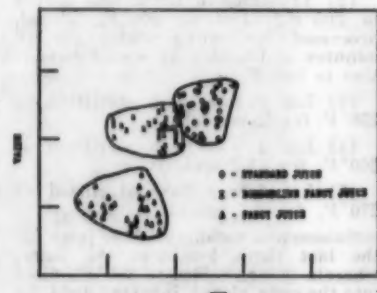
Figure III shows the index of fading (I) plotted against storage time for the borderline fancy tomato juice group and since the other two groups exhibit the same trend again, in this case, they will not be included. There is no indication that color improves on storage for any given sample. These conclusions hold true for each of the three lots.

Figure IV emphasizes the fact that at no time did the three lots of juice leave their original classification; the borderline fancy grade remained borderline fancy, the standard remained standard, and the fancy remained fancy. This is true when comparing each lot with regard to processing methods and storage time.

The spectrophotometric data conflicts somewhat with the visual grading in that visual grading showed a marked improvement of all samples of standard juice upon storage, whereas the spectrophotometer did not. Visual examinations showed that the borderline fancy juice graded into the fancy range, whereas the spectrophotometric data indicated that the juice exhibited no color improvement on storage. This also conflicts with what is generally believed by the industry, and also with the conclusions drawn from our original commercial scale experiment.

On the other hand, the spectrophotometric data verifies visual grading in that little or no color differences were noted between the various methods of processing when equivalent sterilizing values were used for the flashed processes.

FIGURE IV
Hue vs. Value



Conclusions

Investigation of the effect of sterilization temperatures on the color of tomato juice as reported in this paper can be summarized as follows:

(1) The evidence presented indicates that there are no color differences between samples of juice, flash sterilized at different temperatures (250°-270°) when equivalent sterilizing values are used, irrespective of the original grade.

(2) There is no indication that conventionally processed juice is superior in color to flash sterilized juice when the sterilizing values used for the flashed process are equivalent ($F_0 = 0.7$) and do not exceed the heat treatment necessary to destroy *B. thermoacidurans*.

(3) There is evidence to indicate that processes with sterilizing values in excess of 0.7 do impair the color of flash sterilized juice.

(4) It is not possible to draw any definite conclusions from the data obtained, with respect to the effect of storage on the color of tomato juice.

In conclusion, if a canner wishes to flash sterilize tomato juice as additional insurance against flat sour

spoilage or for economic reasons, it can be done without danger of adversely affecting the color of the juice. In order to accomplish this, close control must be maintained with respect to flow rates, temperatures and holding times, so that the resultant time-temperature relationship for a particular unit does not exceed the sterilizing value necessary to destroy *B. thermoacidurans*.

It is recognized that additional substantiating data is desirable, particularly with respect to other types of flash sterilizers and the effect of storage on color. It is evident also that utilization of an objective method of color measurement such as the G. E. Spectrophotometer will be even more helpful once the results obtained by this means can be interpreted in terms of the generally accepted PMA grades and the disk colorimeter. It is hoped that this work can be continued in the near future, and that some of the problems presented will stimulate further activity in this field by other investigators.

References

- (1) Newhall, Nickerson and Judd; J. Opt. Soc. Amer. 39 885 (1948).
- (2) Judd, Nat. Bur. Standards Circular 478.

THE ROLE OF SPECIAL ANALYTICAL TOOLS IN SPECIAL INVESTIGATIONAL WORK AND IN TROUBLESHOOTING

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It is an interesting observation that the major developments in instrumental methods of analysis have been based on some particular property of certain ranges of the electromagnetic spectrum. The analytically useful portions of the spectrum are shown by the cross sectioned zones on Figure 1. Absorption, refraction and reflection of radiation by the sample being studied establishes the basis for many analytical methods. Colorimetric analysis, the rudimentary form of absorption spectrophotometry, is based on a combination of the ability of the human eye to perceive and interpret a stimulus in a certain limited region plus the fact that certain materials absorb energy in that particular wave length band. With the discovery of the ultraviolet range, or that region of the spectrum beyond the limit of visual perception on the short wave length side, and the infrared range, lying just beyond the long wave length end of the visible spectrum, a vast new field was opened up for analytical purposes. Developments were contingent of course on the refinements of methods of producing energy in the specific desired wave length band; methods of measuring absolute or relative energies quantitatively; and availability of suitable materials for optical components and sample containers.

The vibrational properties of X-rays were early applied to analytical problems in connection with crystal analysis but only recently to absorption types of measurements. With recent improvements in stabilizing X-ray sources and with improved intensity measuring methods developed in conjunction with radioactivity measurement, the use of X-rays in analytical problems has progressed rapidly.

Electron microscopy and electron diffraction are powerful analytical tools applying wave motions of electron beams, and represent a further extension into the short wave length region of the spectrum.

There has been considerable interest in the last few years in a systematic study of the spectrum lying between the long infrared radiation and the very short high frequency radio waves. This band promises to be very useful in organic qualitative and quantitative analysis. High frequency radio waves are currently being investigated in titrimetric work as end point indicators. The application seems to be quite promising and improved instrumentation will undoubtedly lead to more extensive use.

Among the specialized instruments which are available in the Research Division of the American Can Company there are quite a number covering various ranges of the complete energy spectrum such as the Infrared Spectrophotometer, the Recording Spectrophotometer, the Ultraviolet

Emission Spectrograph and the X-Ray Spectrometer. During the period of time for which these analytical tools have been available they have been used to guide the investigation of a wide number of problems of interest to the packaging industry, many of which may be of interest to technologists in the canning field. It will be the purpose of this presentation to describe briefly the operating principle, typical applications and limitations of these analytical tools.

Recording Spectrophotometer

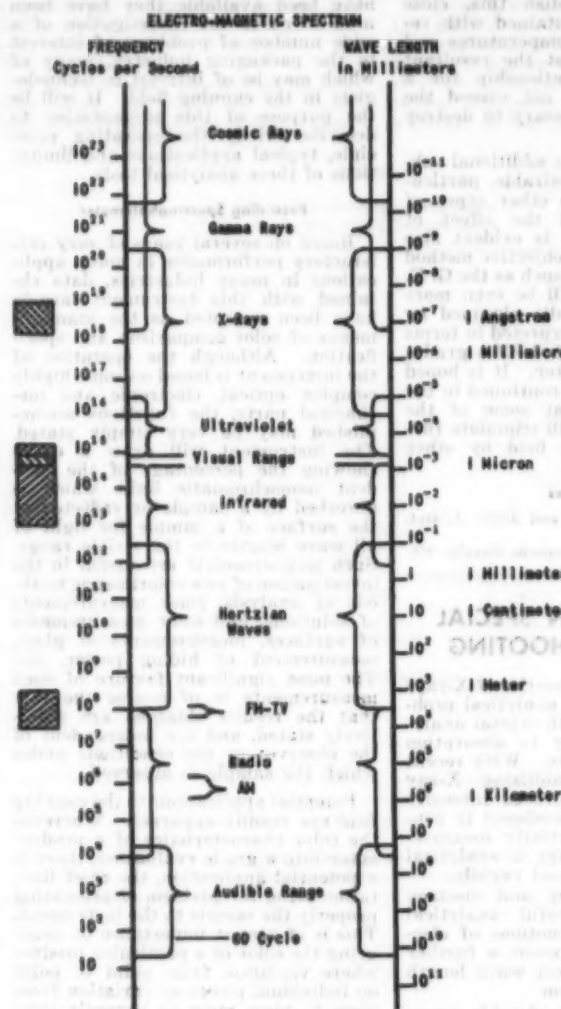
Based on several years of very satisfactory performance in many applications in many industries, data obtained with this instrument largely have been accepted as the standard means of color comparison and specification. Although the operation of the instrument is based on some highly complex optical, electronic and mechanical parts, the functions accomplished may be very simply stated. The instrument will draw a curve showing the percentage of the incident monochromatic light which is absorbed by a sample or reflected at the surface of a sample for light of all wave lengths in the visible range. Such measurements are useful in the investigation of new colorimetric methods of analysis, color measurements of solutions, and color measurements of surfaces, measurements of gloss, measurement of hiding power, etc. The most significant feature of such measurements is of course the fact that the results obtained are objectively stated, and are independent of the observer or the conditions under which the sample is observed.

Potential applications to the canning field are readily apparent. Wherever the color characteristics of a product enter into a grade evaluation, there is a potential application, the chief limitation being the problem of presenting properly the sample to the instrument. This is of utmost importance in measuring the color of a particular product where variation from point to point on individual pieces or variation from piece to piece must be properly integrated. In some cases purees may be prepared for reflective measurements or extracts made for transmission measurements.

Figures II and III illustrate two typical applications of the equipment. The two curves in Figure II show the difference in brightness between white coatings made with anatase and rutile, the two crystalline modifications of titanium dioxide. Variations in all color attributes are shown objectively and infinitely more information is conveyed than by word descriptions of the differences based on visual examination. Figure III shows a series of transmission curves of solvent extracts of peas. Analysis of these curves serves to establish the extent to which chlorophyll is protected during canning by the Blair procedure.

FIGURE I

Frequency Distribution in Electromagnetic Energy Spectrum



The canning operations up through the blanching step result in very little loss of pigment chlorophyll. The thermal process given conventionally packed peas has resulted in a substantially complete degradation to pheophytin, whereas the same peas processed by the Blair procedure retain a considerable portion of the original chlorophyll. This procedure may be used to determine the effects of storage at different temperature levels in order to establish recommended storage temperatures.

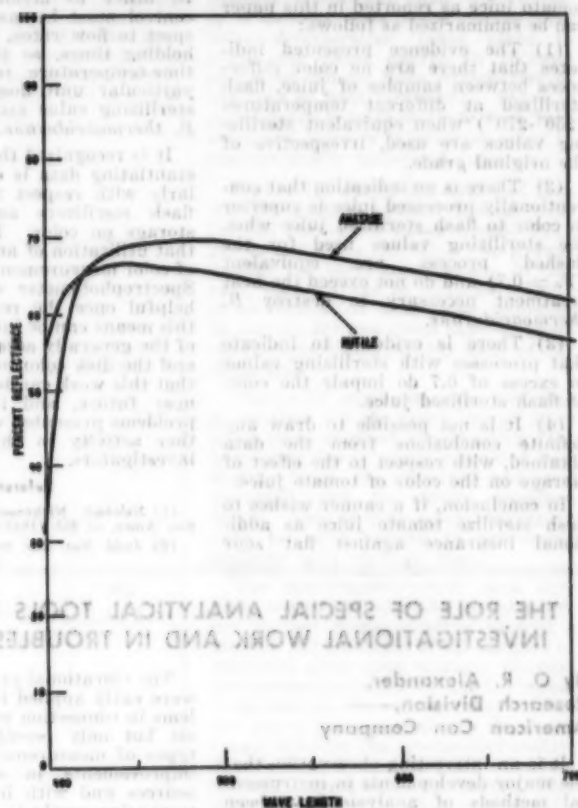
Ultraviolet Spectrophotometer

There are many substances indistinguishable on the basis of visual absorption but which do have ana-

lytically significant differences in their ultraviolet absorption spectra. For substances of this nature, the Ultraviolet Spectrophotometer provides an extremely useful analytical tool. As now manufactured, the instrument does not give a completely automatic record of per cent transmission versus wave length but requires point by point measurement to obtain a complete curve. Although, as previously pointed out, visible and ultraviolet radiation differ only in wave length employed, certain restrictions are introduced. Many types of glass are practically opaque to ultraviolet radiation and it is necessary to use quartz for the optical components of the spectrophotometer as well as for the

FIGURE II

Reflectance Curves of White Coatings Pigmented with Anatase and Rutile Modifications of Titanium Dioxide



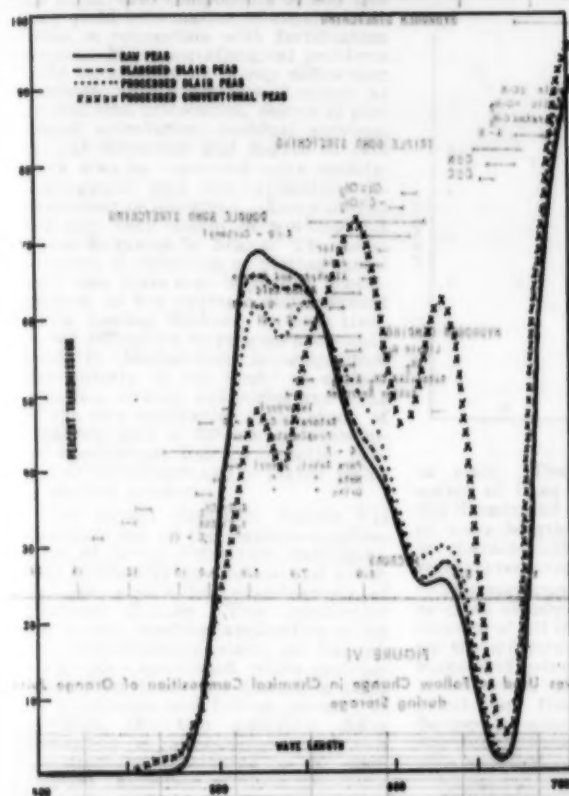
sample cell windows. Mercury or hydrogen arc lamps must be used as sources of energy and special phototubes are used as receivers. From a practical operating standpoint too there are limitations to the solvents which may be used since some solvents are opaque to ultraviolet. It is not safe to assume that a cell which is visually clean will prove to be "ultraviolet" clean.

Typical applications to the canning industry include the determination of vitamins A and D, determination of the nature of off-flavors, determination of insecticide residues, study of unsaturation in fatty acids, and the development of rancidity.

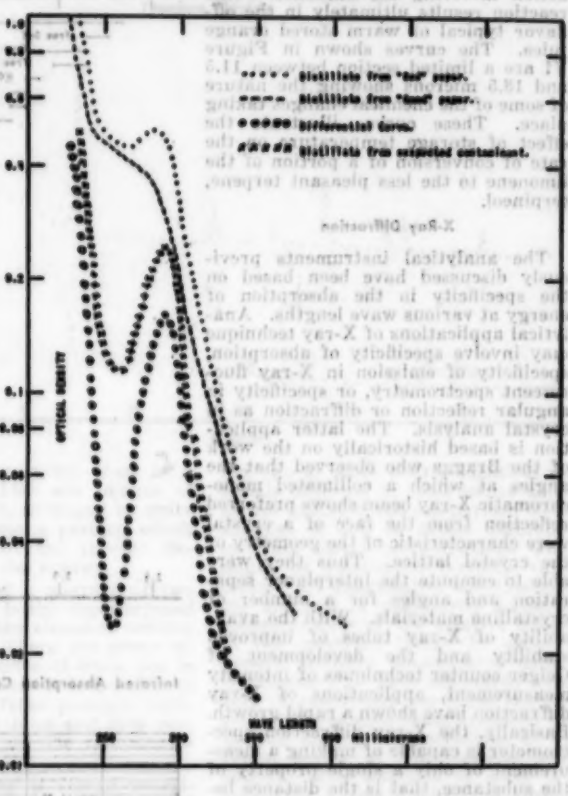
An interesting bit of "detective work" in which ultraviolet absorption spectroscopy played a determining part is illustrated in Figure IV. A dry powdered product containing considerable fat absorbed an off-flavor and odor when packed in certain types of fiber containers. The foreign material was suspected to originate in the fibreboard and to be absorbed by the fat in the product. Absorption curves on steam distillates of the

FIGURE III

Transmission Curves of Extracts of Peas Showing Effect of Canning Operations on Chlorophyll Retention



Ultraviolet Absorption Curves Used in Identification of Odor-Imparting Material in Fiber Containers



"good" and "bad" containers indicated marked differences indicative of phenolic-like materials. It was further established that a chlorinated phenol was used in the paper mill to prevent the growth of microorganisms in the beaters. Distillates from a very dilute aqueous solution of the material actually used as a bacterial inhibitor gave absorption spectra comparing almost exactly with the curve of the taste imparting material isolated from the containers.

Infrared Spectrophotometer

Immediately below the red or long wave length end of the visible spectrum lies a spectral region, again not perceptible to the eye, of great analytical potentiality. It is in this region that molecules of organic compounds exhibit their greatest selectivity in energy absorption. The various substituent groups and interatomic bonds show absorption at frequencies which are characteristic of each so that it is possible to characterize an unknown organic compound by means of its absorption spectrum. Developments in this field were greatly stimulated

by the recent successes achieved in the analytical problems associated with the production of synthetic rubber and high octane gasoline.

Commercial units are now available which automatically produce records of absorption versus wave length over the useful infrared range. As in the ultraviolet range, restrictions are imposed on materials. Sources are usually Nernst Glowers or Globar elements. Optical parts and sample cells must be made of such materials as rock salt, potassium bromide, potassium iodide, lithium fluoride or mixed salt crystals. This also imposes restrictions on the nature of samples. Aqueous solutions are extremely difficult to handle. Work requiring analysis of solutions is complicated too by the fact that there is no really good transparent solvent available, carbon disulfide and chloroform being about the best. It is also axiomatic that results obtained by means of infrared absorption can be no better than the interpretive ability of the organic chemist responsible for the work.

The chart shown as Figure V is a somewhat simplified picture of the

characteristic absorption bands of various organic structural units. The absorption peaks are shown as ranges rather than points because the frequency is subject to shifts to higher or lower wave length depending on the structure of the remainder of the molecule. It is not always possible on the basis of infrared absorption spectra to distinguish between closely related compounds as for example adjacent members of an homologous series.

Among the applications which have been made of infrared analysis, one of the most interesting has involved a study of the chemical changes in canned orange juice taking place during storage. Some of the results of this study have been published and more are expected. The major factor in the flavor degradation seems to involve chemical changes in the oil phase or that portion of the product which separates as a water insoluble steam volatile fraction. Contrary to most early opinion, oxidation plays only a minor part in the over-all effect. A study of the infrared spectra of numerous samples of known history

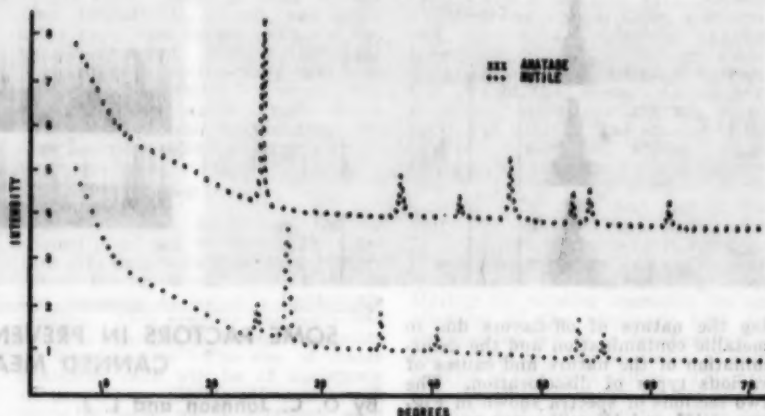
useful in the investigation of methods of water treatment. X-ray diffraction analysis has been applied to the analysis of mineral components of soil and may yield information of considerable value in connection with fertilization studies. Many metallurgical problems yield to a study by X-ray diffraction methods; such properties of metals as crystal size, orientation, degree of preferred orientation, residual stresses, crystal distortion and degree of cold work may be measured quite readily. Segregation and intercrystalline deposits may be identified. X-ray studies are also very useful in working out phase diagrams for alloys. The measurement of thickness of plating metal over base plate may be readily accomplished, as for example measurement of tin coating thickness on base steel. X-ray diffraction techniques are widely used in biochemical investigations, particularly in the study of certain proteins, viruses, antibodies and some of the new antibiotics. The study of catalysts used in different petrochemical applications has led to better control of conversion and to higher yields of desired products.

The curves shown in Figure VII illustrate one of the classical applications of X-ray diffraction techniques, that of identifying anatase and rutile, the two crystalline modifications of titanium dioxide. This application has a very practical application to the can manufacturer since, as has already been mentioned, white coatings made from these two materials differ in brightness and hiding power. In addition, the two materials differ somewhat in abrasiveness and this too must be considered in the commercial utilization of these pigments.

Emission Spectroscopy

A slightly different analytical approach is made in the application of emission spectroscopy. All quantitative and qualitative spectrographic analysis is based on the fact that the energy given off as light by any element is related fundamentally to the atomic structure of the element and that it is not made up of light of all wave lengths, but is composed of light of many single wave lengths. A spectrograph may be used to break up the heterogeneous wave length mixture and record the separate wave length pattern. The optical components of a spectrograph and their arrangement are subject to considerable variation. For most analytical purposes, quartz prisms or ruled reflection gratings are used as dispersing elements and quartz lenses or front surface reflecting lenses are used as focusing or camera lenses. The arrangement is usually such that the light from the sample illuminates the slit of the spectrograph. This illuminated slit is then photographed by the spectrographic camera; the function of the dispersing element is to bring the light of different wave lengths to a focus at separate points on the film

FIGURE VII
X-ray Diffraction Patterns Differentiating between Anatase and Rutile Modifications of Titanium Dioxide



or plate. The spectrum then is a series of lines which are images of the illuminated slit, arranged by order of wave length into a pattern which is characteristic of the specific elements producing the energy.

The spectrum of a mixture of two or more elements is the superimposed spectra of all of the elements making up the mixture. There are many instances of coincidence of lines, but in almost every mixture it is possible to select lines free from possible interference by nearby lines and thus permit identification of the components of a mixture.

Electrical energy is almost invariably used to excite the spectrum. The current voltage relationships are quite variable and are selected to meet specific conditions. The combination of the high temperature of the electrical discharge plus the effect of electron bombardment causes the atoms volatilized into the arc to become luminous. Although it is historically one of the oldest methods of producing spectra, flame excitation is now being widely used in flame photometers for the determination of alkali and alkaline earth metals.

As a means of qualitative analysis, the spectrograph has no equal. It is possible on the basis of a single exposure to detect the presence or absence of some 70 odd metallic elements. Only a minute amount of material is actually consumed in the process and the determination can be carried out quite rapidly. Quantitative analysis may be more difficult. Other variables being constant, the higher the percentage of a given element present in a mixture, the darker will be the spectrum lines of that element, as recorded on the photographic plate. It is thus possible to establish relative concentrations in closely similar samples with little difficulty. This affords a very convenient method of compar-

ing two or more nearly identical materials differing in some minor aspect as, for example, the comparison of two samples of soil to detect differences in trace metal concentrations which might be related to fertility variations. All quantitative spectrochemical analysis is necessarily based on measurements of the relative density of the spectrum lines. In order to permit accurate quantitative data it is necessary to have standards available of essentially the same composition as the sample being analyzed containing known concentrations at different levels of the element being sought. The analysis of steel is a relatively simple application since it may be considered to be fundamentally the analysis of iron for various trace elements present in relatively small amounts.

The analysis of food products is a much more formidable problem since the mineral composition of natural food materials is subject to wide variations. This may be further complicated by variations introduced in processing, such as the addition of salt. This is not meant to imply that such problems can not be handled by spectrographic means, but rather to indicate some of the limitations. The most serious limiting factor is the initial investment in rather expensive equipment and the fact that operation of the equipment must be in the hands of skilled technicians.

There have been many instances since this equipment has been available to us where its use has provided the information necessary to solve some particularly vexing problems of interest to the canning industry: the identification of extraneous matter in canned food; tracing down the source of metal fragments found in canned foods; determining the suitability of corrosion inhibiting paints; establish-

FIGURE VIII

Portions of Spectrograms of Food Product Showing Copper Contamination as the Cause of Discoloration

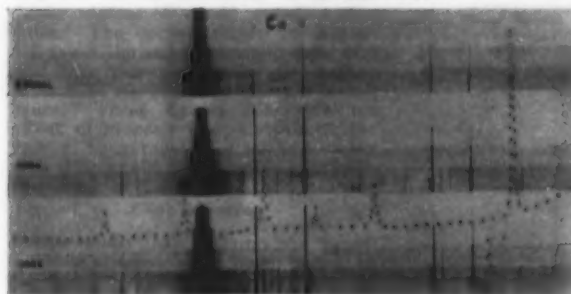
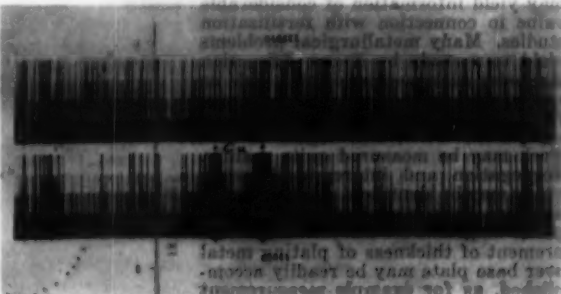


FIGURE IX

Portions of Spectrograms Revealing the Source of the Copper Contamination and Discoloration in Figure VII



ing the nature of off-flavors due to metallic contamination and the determination of the nature and causes of various types of discoloration. The two sections of spectra shown in Figures VIII and IX will serve to illustrate one such problem. The illustration in Figure VIII shows a section of the spectra of three samples of a chicken base product in which a grey to greyish black discoloration was appearing. The first sample was normal in appearance, the next two showed the dark discoloration. Inspection of the spectra of these three samples indicated that the major difference was in the relative amounts of copper, rather low in the normal sample and relatively high in the discolored material. Subsequent spectrographic examination of filings from some of the handling equipment resulted in the spectra shown in Figure IX. The first spectrum is that of filings taken from a piece of equipment made of almost pure nickel while the second was obtained from a piece of equipment thought to be nickel but actually made of monel metal, an alloy of nickel and copper. Traces of copper dissolved from this equipment reacting with sulfide ion produced by partial breakdown of the sulphur containing proteins proved to be the cause of the discolorations.

Conclusion

In conclusion it would probably be well to emphasize the point that all of these instruments, remarkable as they are, are in the final analysis only analytical tools. As with all tools, the end results achieved can be no better than the workmen using them. Practically all are relatively complex and require skilled and trained personnel for maintenance and operation. Each, when properly used for jobs for which it was developed, is capable of yielding information of great value. No one instrument, however, approaches that ideal of most students of quantitative analysis, the instrument with a hopper for introducing samples, a crank for operating and a ticker tape for recording results.

SOME FACTORS IN PREVENTING DISCOLORATION OF CANNED MEAT PRODUCTS

By O. C. Johnson and L. J. Frost, Research Department, Continental Can Company

Every meat canner has at some time experienced discoloration in one of his products. Fourteen such instances have been reported to our laboratory in the past five years, all from different canners. A review of some of the factors involved may serve to minimize future economic loss by pointing out precautions which every canner should observe.

For the purposes of this discussion, we will consider only discoloration of the product since staining of the container is not usually objectionable. The types of discoloration most frequently encountered are (1) metallic sulfide discoloration, commonly black or dark brown; (2) iron salts other than sulfides on the surface of non-sterile luncheon meat, usually brown in color; and (3) the fading of surface color which commonly occurs due to oxidation. There have been isolated instances of other types of discoloration such as that caused by the canning of a product already discolored (green sausage), by the presence of an excessive amount of the curing agent sodium nitrite, or by the presence of tannins. This discussion, however, will be limited to the most common type, which is the black or dark brown discoloration due to metallic sulfides.

Ordinarily a black discoloration will result in a canned meat product when iron in solution combines with sulfides under conditions favorable to the precipitation of iron sulfide. In practice the interrelation of the factors responsible for the trouble may be more complex than is originally assumed from the simple chemical reaction which has been mentioned.

Effect of Metals

The metals responsible for the black or brown discolorations are usually

iron and/or tin or a combination of iron and/or tin and copper. They may be derived from the equipment used such as meat trucks, tanks, kettles, chutes, filling machines or pipe lines. Although black iron equipment finds widespread use in meat canning plants, it may cause discoloration under certain circumstances. Rusting should be prevented as much as possible by careful oiling of the equipment with refined mineral oil when it is not in use. Copper-bearing metals such as brass or bronze should be avoided. The presence of copper in a product is particularly harmful due to the fact that it apparently catalyzes the formation of iron sulfide. Stainless steel, aluminum, and similar metals are highly recommended for all metal equipment or handling surfaces due to their resistance to corrosion or oxidation. Although metallic contamination from the equipment is usually due to the presence of oxides resulting from the reaction of iron or copper with the air, it may originate from improper cleaning methods which result in the presence of other metallic salts such as phosphates or sulphates. (1)

It is not always easy to find the source of metallic contamination. In one instance, intermittent discoloration occurred and 10 ppm copper was found in the discolored portion. By careful observation the canner was able to locate the source of copper. A very small amount of brine dripped from a corroded brass valve, directly down into a vat of cured meat.

The concentration of iron in the discolored portion of a canned meat may be readily determined and compared to that in a normal portion but from this a figure cannot be set at which one would expect discoloration to occur because of the other variables involved. The catalytic effect of copper in producing iron discoloration is an important factor which should not be overlooked. For example, the discolored portion of a sample of bulk

sausage was found to contain 40 ppm iron and 1 ppm copper. The copper was derived from a filling machine which had not been recently used, and the first part of the run was badly discolored. Tests demonstrated that 100 ppm iron could be added to a sample without causing discoloration if copper were absent. Chromium plating of the bronze parts of the filler was effective in preventing discoloration. Plating does wear off and must be inspected regularly to prevent difficulty.

Role of Tin Coating

The container used for canned meats is made of steel with a relatively thin coating of tin. A tin coating on a steel base plate can theoretically protect the base from corrosion by forming a perfect seal over the steel, and as such would provide mechanical protection. (2) Complete protection of this nature is impractical. All tinplate has a slight degree of porosity depending upon the type of tin coating, i.e., electrolytic or hot dipped and the thickness of the coating on the steel base plate. Even with the best tin coatings for complete coverage of the steel base plate absolute perfection is never obtained. Under normal conditions when meat is processed in a plain (unenameled) can, some tin and iron go into solution. However, under the special conditions existing inside the container, the tin becomes anodic to the steel in a relatively short time and protects it from further corrosion. These dissolved metals are usually insufficient to produce discoloration of normal meat, although the container may be stained with brown tin sulfide or black iron sulfide. Under abnormal circumstances, the discoloration may be transferred to, or form on, the product. Such an instance came to our attention not long ago. Millions of cans were used during the war for packing Vienna sausage for the Army. These cans were not enameled inside and the same specifications for the product were used by several different packers without discoloration resulting. In the one case where trouble was encountered the sausage was discolored where it was in contact with the side of the can. A thorough check was made for copper in the equipment or in the material used. The concentration of trace metals in the discolored portion was low except for tin. It was noted that the product was very difficult to remove from the can having apparently stuck to the sides of the container. The staining of the side of the container was also more severe at each of the interfaces between the sausage and the brine, each sausage leaving two streaks down the side of the can. It was theorized that the sausage fit so tightly that a series of cells were formed and that corrosion was accelerated due to a variance in oxygen tension. Since the discoloration seemed to be associated with the sticking of the product to the con-

tainer, the formulation of the product was examined. An unusual feature was that the beef component was entirely bull meat instead of the usual canner cows. Although this did not seem undesirable, a test was made using beef from canner cows and the trouble vanished. Similar variations from normal practice may result in objectionable discoloration where least expected, and therefore such variations should be carefully checked before the pack assumes large proportions.

Enamel Linings

Although the advantages of an enamel lined can were recognized before (3), they were used to a greater extent during World War II due to the necessity of using a lighter tin coating. This practice has continued and has resulted in fewer complaints of discoloration. The use of inside enameled cans will be of assistance in preventing discoloration although there is some metal exposure even with enameled plate due to unavoidable fracturing or scratching of the enamel during manufacture and sealing of the container. Since a great deal of the troublesome discoloration occurs at the interface between the meat product and the can, zinc oxide bearing enamels offer twofold protection. First, there is the mechanical protection afforded by the organic enamel film similar to the mechanical protection given by the tin coating. Second, and at least as important in preventing objectionable discoloration is the chemical protection given by the zinc oxide pigment in the "C" type enamels. Sulfur if present in active form, will combine with the zinc forming a usually unnoticeable white zinc sulfide. Thus, a part, at least, of the objectionable sulfur is tied up in an almost invisible form.

Due to the recently imposed restrictions on the use of tin, it will again be necessary to use enameled steel plate for the ends of some meat cans. This will not introduce a discoloration problem if care is taken not to fracture the enamel by deep embossing and if scratching or scuffing of the enamel is avoided.

The use of an enameled can must not be considered as a panacea, however, for trouble with discoloration has been encountered even though enameled cans were used when products were contaminated with iron and copper.

Meat Constituents

In contrast to the relatively simple metallic elements of iron, copper, and tin which may be involved in discoloration, meat and the other ingredients used in the formulation of canned meat products are very complex in composition and have been found to vary to such an extent that objectionable discoloration sometimes has resulted (4). The active sulfur which combines with the iron to form iron sulfide is derived

from the meat. It has been estimated that all muscle protein contains approximately 1 percent sulfur, most of which is present in the amino acids cystine and methionine (5). As soon as life in an animal stops, abnormal and sometimes deleterious changes take place. The meat undergoes bacterial or enzymatic action and oxidation on continued storage. Some meat is frozen, other portions are cured, pickled or cooked. The amount of the primary constituent, protein, which contains the sulfur will vary considerably in the different portions of the carcass. The type and age of the animal as well as its conditioning prior to slaughter together with its handling after death all contribute to the characteristics of the final canned product. During the canning operation the application of the necessary heat for sterilization results in denaturation of the protein and the liberation of sulfhydryls or hydrogen sulfide. This protein breakdown must be considered normal, and the resulting active sulfur does not produce an objectionable discoloration under normal circumstances.

The simple chemical reaction, metal ion plus sulfide ion equals metal sulfide, proceeds according to the laws of mass action, and the amount of metallic sulfide formed depends upon the concentrations of the two reacting constituents. When the metal ion and sulfide ion concentrations are both in a reasonable range, no metallic sulfide discoloration will occur, but if either one assumes a high concentration, metallic sulfide is formed. In this connection, the inclusion of air in the can is objectionable as it increases the concentration of the metallic ions by corrosion of the container. In some instances when the container characteristics and the canning practices remain the same, the nature of the meat or the pretreatment of the product may enhance the production of large amounts of active sulfur which may result in small amounts of tin or iron producing serious discoloration. The mass action effect must be considered in all meat discoloration problems, since the concentrations of the reacting substances are usually not uniform throughout the product and consequently produce localized areas of discoloration.

Low pH Helpful

The chief offender among the meat products from a discoloration standpoint is tripe. It has long been the custom to treat tripe with vinegar preparatory to canning. Lowering the pH of the tripe in this manner represses the ionization of the hydrogen sulfide formed during processing and the precipitation of iron sulfide does not occur (6). This principle is used in preventing discoloration in tripe and products containing tripe, chitter-

lings, and potted meats containing hog stomachs.

This acid or vinegar treatment is necessary, since certain offal items such as tripe, hog stomachs, cheeks, and chitterlings have a pH ranging from 7.0 to 8.2, which is conducive to the formation of iron sulfide. In practice, reducing the pH of tripe to 5.5 to 5.7 will usually suffice to prevent discoloration if the metal pickup is not excessive. When tripe or hog stomachs are used in comminuted products such as potted meat food products, the vinegar treatment is sometimes omitted, and discoloration has been observed in such products at a pH of 6.5. Depending on the amount of offal products used and the extent of metallic contamination, suppression of discoloration may be obtained by reducing the pH to about 6.0 either by treating the material with vinegar prior to chopping or by adding vinegar to the product. Discoloration in a comminuted product has appeared uniformly distributed within the product due to trace metals from the equipment being intimately mixed throughout the batch.

The pH of fresh meat ordinarily used may range from 5.8 to 6.2 and should be considered as satisfactory for canned meat. However, the treatment of the meat prior to canning may have an adverse effect on the product. For example, it was found that meat trimmed from cooked bones had a pH higher than normal, possibly due to some constituent of the bones, and apparently produced an excessive amount of hydrogen sulfide. This tendency was increased when the cooked meat was frozen before use. Although this method of handling meat was advantageous from an economic standpoint and would not appear to be harmful, it was certainly unusual, and the end product had a marked tendency to discolor. This instance is typical of similar occurrences, and it is therefore advisable to give consideration to possible discoloration when deviating from established procedure or usual formulation. When a new ingredient is used or substituted for the old, tests should be run far enough in advance of regular production to observe if discoloration will result on storage.

Summary

In discussing the causes of discoloration in canned meat, we have also presented the usual methods used in preventing the trouble. To summarize these:

1. Avoid inclusion of trace metals in the product by proper choice of equipment coming in contact with the meat and by proper methods of cleaning such equipment.

2. Where practical use an enamel-lined can although this naturally will not prevent discoloration when it is

due to metallic contamination prior to canning.

3. When the final product has a pH greater than that of normal meat due to the nature of the material used or its pretreatment, the formation of iron sulfide is favored and acidification should be employed.

4. When changing method of preparation or formulation of product, consider possibilities of these changes promoting discoloration and test pack small lots before starting commercial production.

Attention to the above factors should tend to minimize discoloration problems in canned meat products.

PROBLEMS IN THE PROCESSING OF FRUITS

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While considerable work is necessary to establish a safe process for a low-acid food, determining a process for a fruit product is considerably more complicated. The primary criterion of a process for low-acid foods is that it be adequate to destroy maximum numbers of spores of *Clostridium botulinum* under all conditions of packing, and regardless of the effect on the quality of the product. Any improvement in quality must come from changes in preparation procedures or in methods of processing, subject always to the consideration that all *Cl. botulinum* spores must be destroyed.

With fruits, on the other hand, quality is the first consideration. While it is true that prevention of spoilage is important from an economic standpoint, no health hazard is involved, and many a packer is willing to risk some spoilage to improve the quality and salability of his pack. A process must therefore be balanced between giving the maximum protection against spoilage and having the least possible deleterious effect on quality.

The same fruits vary greatly in character according to variety, yearly growing conditions, time of harvest, maturity, and location where grown. Soft fruit tends to break down on heating, and consequently slows down the rate of heat penetration. The types of microorganisms which will grow in a fruit and their heat resistance are greatly influenced by pH. The problem introduced by this factor alone is illustrated by the fact that Bartlett pears may vary in pH from 3.6 to 4.7, and Blenheim apricots from 3.2 to 4.3. When the pH is above 4.0, spore-forming bacteria, particularly the butyric anaerobes, must be considered as possible spoilage agents,

Bibliography

- (1) Continental Can Company of Canada Limited, Research Department. Unpublished report, 1948-1949.
- (2) Uhlig, Herbert H., Ph.D. "The Corrosion Handbook," John Wiley and Sons, Inc., New York, pp. 539-556-1948.
- (3) Hallman, G. V. "Enamel Lined Cans for Use in the Canned Meat Industry," *Canning Age*, p. 198, April, 1936.
- (4) Jakobsen, Finn and Mathiesen, Erling. "Corrosion of Containers for Canned Foods," 1. Kommisjon Hos Jacob Dywad, pp. 14-15-1946.
- (5) Block & Bolling. "The Amino Acid Composition of Proteins and Foods," Charles C. Thomas, Springfield, Mass.-1946.
- (6) Rupp, V. R. "Canned Meats—Effect of pH on the Formation of Ferrous Sulfide," *Industrial & Engineering Chemistry*, Volume 27, p. 1053—September, 1935.

but below pH 4.0, bacterial spores are not likely to germinate, and a process need be adequate to destroy only yeasts, molds, and vegetative cells of bacteria.

There are usually three steps in the establishment of a process for a product:

- (1) Obtaining heat penetration data
- (2) Obtaining thermal death-time data on significant spoilage organisms
- (3) Checking the process calculated from the data obtained in steps (1) and (2) by experimental packs inoculated with a suitable test organism.

Heat Penetration Tests

In 1949 a cooperative project was undertaken to obtain heat penetration data on fruits processed in both still and rotary cookers. Participating were the National Canners Association, the American Can Company, the Continental Can Company, and the Food Machinery and Chemical Corporation. The following products were studied:

Apricots, unpeeled halves; Apricots, whole peeled; Clingstone peaches, halves; Clingstone peaches, slices; Freestone peaches, halves; Fruit cocktail; and Pears, halves.

In the case of fruits packed in syrup, there was found to be a break in the heating curve, with a very much slower heating rate after the break than before. The lower the sugar content, the higher the temperature at which the break occurred, culminating in almost a straight line heating curve for water packed products. The softer the fruit, the lower the temperature at which the break occurred. For the same initial temperature and the same conditions of packing, the break seemed to occur at about the same number of degrees below retort temperature, regardless of the retort temperature used. In most cases, with the exception of fruit

cocktail, the break in the heating curve was accompanied by a pronounced drop or leveling off in temperature. Because of this temperature drop, mathematical formula methods cannot be used to determine for syrup pack fruits still retort processes protective against spoilage by acid-tolerant spore-forming bacteria, and heat penetration data for this purpose must be evaluated by the general, or graphical method.

Another irregularity noted was the fact that although the heating rate after the break did not change with an increase in processing temperature, the heating rate before the break became more rapid. Taken in conjunction with the drop in temperature at the break, this means that it is not possible from data obtained on one can size at a given temperature to calculate processes for other can sizes, or to calculate processes for other temperatures. Data must therefore be obtained on every can size at every processing temperature desired. This greatly increases the amount of experimental work necessary as compared with determining processes for low-acid foods.

The break in the heating curve with its accompanying temperature drop was found to be caused by floating of the fruit as the temperature rises. In floating, the fruit packs closely together, and heat transfer changes from convection to conduction. When this packing together occurs, the temperature of the syrup trapped among the pieces of fruit drops for a while, because the temperature of the fruit is somewhat below that of the syrup.

Another important variable is fill. While heavier fills of fruit do not have such a pronounced effect in the case of syrup packed products, they markedly reduce the rate of heat penetration in fruits packed in water.

The thermocouple rod itself is an impediment to the exact determination of heating rates, because it interferes with the movement of the fruit in the can during processing. This is perhaps more significant in the case of rotary cooks than in still cooks.

In general, the data obtained on cans heated in a rotary cooker were of a similar nature to those on cans processed in a still retort. A similar break in the heating curve was noted, but at a higher temperature and without the accompanying temperature drop. Consequently, the formula method for the calculation of processes can be applied to heat penetration data from cans processed in rotary cookers. However, even for rotary cookers it is still impossible to convert data for one set of conditions to another, and heat penetration tests must be made for every product, for every can size, for every retort temperature, and for every speed (cans per minute).

Certain acid products, particularly tomatoes, are so variable in their heating characteristics that it is extremely difficult to decide on the data to use as a basis for process calculations. Cans packed and processed under apparently identical conditions may show a wide range of heating rates. This is to some extent true of fruits generally, and it may be necessary to use average heat penetration data instead of data from the slowest heating can in calculating processes for most fruits and tomatoes. Processes based on data from slowest heating cans would result in most of the cans being greatly over-processed.

Selection of Test Organisms

Having obtained the heat penetration data, it is necessary to know or to assume a slope (z) for the thermal death-time curve, and a lethal time (F) at 250°F, 212°F., or some other temperature, through which this curve passes. This F value for any given species of microorganism in a particular medium depends on the number of contaminating organisms, and unfortunately little is known of the maximum or even the normal contamination of fruits and tomatoes with significant spoilage organisms.

This makes the problem of suitable test organisms a difficult one. For products with a pH above 4.2, it has been satisfactorily shown that spores of the butyric anaerobes are significant. Butyric spoilage has been demonstrated in fruits and tomatoes with pH values lower than this, but germination of spores at these lower pH levels has not been obtained under laboratory conditions. The amount of heat to which the products were subjected, however, would indicate that spoilage was due to the survival of spores. This raises the question of how it is possible to determine when all vegetative cells have been destroyed and only spores remain. It is known that vegetative cells of certain of the butyric anaerobes will grow in pears down to pH 3.6. However, in thermal death-time work it is not possible to know that all cells in a suspension are vegetative, and that none has sporulated.

For the great variety of fruits and fruit products whose pH is below the level at which spores will germinate, the selection of test organisms of maximum heat resistance involves considerable work. Large numbers of cultures must be isolated from spoiled cans of each product, and if naturally spoiled material is not available, cans must be underprocessed to induce spoilage. Another procedure for obtaining significant spoilage organisms is to inoculate cans of the fruit with samples of soil from the areas where the fruit was grown, and underprocess the cans.

After cultures have been isolated, it is necessary to adapt them to laboratory conditions, and to determine their limits of growth in the products under investigation. The most promising cultures are then selected on the basis of thermal death-time studies. Such a program, even for one product, may involve several years of work before the results can be applied to processing studies.

Another problem in the selection of spoilage organisms for experimental work is the difficulty, in many cases, of determining whether spoilage occurred as a result of leakage of the container, or underprocessing. For the more acid fruits, the spoilage types from each condition appear to be very similar, and it is not always possible to determine by an examination of can seams whether or not the can leaked.

Normal Bacterial Loads

The amount of contamination of the product before processing which must be considered significant with respect to spoilage, can be determined only by bacteriological surveys in a plant during normal operating conditions, and again when spoilage is occurring. Little information of this kind is available for fruit products. In most cases, fruit spoilage is sporadic, and may be present in only a few days' pack out of the whole season. By the time the cans have been held long enough for spoilage to develop, the trouble is over, and conditions in the plant are back to normal. This has been particularly true of spoilage by the butyric anaerobes, and it was not until 1950 that the National Cannery Association was able to study an outbreak of this type which lasted throughout the season. The product was tomatoes, and it was possible to demonstrate for the first time that while considerable contamination of the raw material was present, a marked build-up occurred in the dump tank and flotation tank in the line. Total contamination in this case amounted to as much as 6,000 spores per No. 2 can. A process adequate to insure freedom from spoilage in a pack with this much contamination would result in a pronounced deterioration in the quality of the product.

Studies on flat-sour spoilage of tomato juice by *B. coagulans* (*B. thermoacidurans*) have shown wide variations of contamination with spores, due to build-up in the cannery. A pasteurization treatment equivalent to 42 seconds at 250°F. has proved adequate for the destruction of a relatively high spore contamination (about 10,000 spores per can). By strict attention to sanitary practices, some cannery have used pasteurization treatments affording much less lethal

ity without encountering spoilage difficulties.

There is no question, therefore, but that the contamination of fruits and tomato products is dependent to a large extent on the efficiency and frequency of clean-up operations. As a result, some plants need to use more severe processes than others for the same products. Where minimum processes are used, the greatest attention to sanitation is necessary, and continuous bacteriological control is advisable.

Factors Affecting Thermal Death-Time

In determining thermal death-times of fruit and tomato spoilage organisms, factors to be considered are the product in all of its variations, including particularly pH; the sugar content of the syrup; and the number of organisms. Wide variations in F and z values have been obtained with the same microorganism heated in different lots of the same fruit, even at the same pH. Little is known at present of the factors other than pH which influence the thermal death-time characteristics of microorganisms. Fruit from different areas received at one cannery may vary greatly in composition. Would a packer therefore be justified in varying his process accordingly? At present we have no answer, except where there is a pronounced difference in pH.

Since pH has such a great influence on thermal death-times and on the germination of bacterial spores, it is often helpful to add acid to some products which are normally high in pH. This is particularly true of certain fruit nectars and winter pears. However, our knowledge is not sufficient to enable us to give a definite pH as a dividing line. While pH 4.2 seems to be safe enough for some products, for others it may be hazardous, and the limit for control in these may be 4.1 or even 4.0. However, this is based largely on commercial experience, and not on laboratory demonstrations. Considerably more study is needed on this subject.

Use of Inoculated Packs

Most fruits and tomatoes in the West are processed in rotary cookers. Because the thermocouple rod interferes with the free movement of the pieces of product during rotation, results of heat penetration measurements are not too reliable. Inoculated experimental packs should be made to check all calculated processes, and this brings us back again to the problem of suitable test organisms, which have not as yet been determined for most acid products.

The same limiting factor applies to experimental work on the holding time necessary for presterilization, hot fill

procedures, where the heat in the product at the time of filling is relied on to sterilize the cans and lids. While a holding time of 3 minutes before cooling is at present recommended with closing temperatures of 195°-205°F., depending on can size, this is entirely an empirical figure. To determine what is necessary experimentally would involve the inoculation of covers and empty cans with suitable test organisms; filling and sealing at different temperatures; holding for various times before cooling; and determining the relative amounts of spoilage in the different lots on incubation. This work also has been held up because of the lack of suitable test organisms.

In determining processes based on experimental work, it is necessary to know what constitutes significant spoilage from an economic standpoint. It is undoubtedly true that considerably more swell spoilage can be tolerated than flat sour spoilage. Should processes be calculated to allow for one swell per 1,000 cans, one per 10,000 cans, or how many? Some acceptable figure must be arrived at.

RADIATIONS AND THEIR APPLICATION IN FOOD PROCESSING

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of Technology

Foods are customarily preserved by application of heat, but in recent years attempts have been made to sterilize foods with little or no heat by applications of different radiations.

Up to the present time, sonic vibration has not been found suitable for sterilizing foods. Radioactive isotopes do not completely sterilize foods containing bacteria or fungi, are expensive, and may present certain health hazards. Radio waves and infrared radiations apparently have no significant bactericidal effect other than that resulting from the rapid production of heat, which in itself may be advantageous, however, in food processing.

Practically no heat is produced by irradiation with ultraviolet light, X-rays, and cathode rays (artificially produced electrons). Ultraviolet light has a surface effect only. X-rays can be used to destroy microorganisms in foods, but the procedure is inefficient from the standpoint of power and time (10 to 20 minutes) required to destroy spore formers.

Cathode rays destroy all microorganisms in food products, including spore-forming bacteria of the types of special interest to the canning industry. The destruction is accomplished rapidly—usually in a few seconds or less. The temperature of

Summary

In summary, it may be said that we need much more heat penetration data on fruits and tomatoes processed in still retorts and in continuous rotary cookers. These data should cover the common variables encountered in the packing of these products—maturity, fill, strength of syrup (if any added), can size, retort temperature, and speed of rotation (in the case of rotary cookers).

From the bacteriological standpoint, there is a great deal to learn as to the microorganisms that may be responsible for spoilage of the various products at different pH levels, and as to their thermal death-time characteristics. Only when the most significant species are known and have been studied can inoculated experimental packs be made which will give reliable data applicable to process determinations.

There is, therefore, a broad field for research on the processing of fruits and tomatoes, both because of the great variety of products, and the complexity of the problems involved in processing them to prevent spoilage without undue sacrifice of quality.

food products so treated will be increased only a few degrees F.

Microorganisms can be destroyed by cathode rays in any food medium and in foods packaged in containers of metal, glass, fiber, or plastic, provided the containers and their contents are within the thickness limitations (less than one inch) of the irradiation equipment used to date. The construction of equipment designed to increase greatly the depth of penetration is nearing completion.

Cathode ray irradiation has also been found applicable to the sterilization of surgical sutures, animal casings, other tissues, pharmaceuticals, antibiotics, and textile materials.

Studies have been made to determine the effects of cathode ray irradiation on different nutritive constituents of foods, such as vitamins and amino acids, which are affected only slightly. More radiation energy is required to inactivate enzymes than that necessary for sterilization.

Further experimental work is necessary before cathode ray irradiation can become a commercial method for food processing. Each specific food has to be considered as a special problem, because with some products flavor and color changes occur during cathode ray irradiation which cannot always be predicted.

Oxidation-reduction dyes have been successfully used, both qualitatively and quantitatively, as radiation indicators.

N.C.A. EXPERIMENTAL PROGRAM WITH SUBTILIN

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Introduction

Late in 1949, there was a quick growth of interest in the canning industry and elsewhere in the possibility of using the antibiotic subtilin and mild heat in the preservation of certain canned foods which are now preserved by high temperature processing. This interest was stimulated and maintained by releases and scientific papers from the Bureau of Agricultural and Industrial Chemistry, of the U. S. Department of Agriculture (1) (2) (3) (4), which reported the successful experimental application of this new principle. In the early reports, it was claimed that subtilin would destroy spores of *Clostridium botulinum* and other food spoilage organisms (3) (4). However, toward the end of 1950, a report was made by H. S. Olcott, of the Bureau of Agricultural and Industrial Chemistry, USDA, that suggested certain limitations in the efficiency of subtilin as a sterilizing agent (5).

Prompted by the releases from the Department of Agriculture, the National Canners Association Research Laboratories initiated studies with subtilin early in 1950. Initial findings were encouraging, but as studies continued the results became progressively more contradictory to the premise that subtilin would destroy spores of spoilage bacteria, particularly those of *Cl. botulinum*. The industry, as well as the USDA, was kept currently informed of significant conclusions from the N.C.A. studies (6) (7) (8) (9) (10).

Control Plan

As a guide for the initial studies and future researches, a control plan for investigating the preservation of canned foods by antibiotics was prepared in cooperation with the American and Continental Can Companies. This plan is shown in Figure I. As indicated in the plan, precedence is given to botulism studies, since the basic requirement would be the ability of the antibiotic to prevent elaboration of the toxin of *Cl. botulinum*. If the antibiotic were completely effective against botulism, the secondary interest would be in the effectiveness of the antibiotic against other important spoilage organisms. Should efficiency be completely established with respect to control of spoilage organisms, final work would center upon technological studies. Consideration by other agencies would apply to a part of the industrial problem and to the regulatory phase.

The investigations with subtilin have included laboratory tests and

inoculated pack studies with both *Cl. botulinum* and a number of organisms of the typical non-pathogenic spoilage types. The subtilin used in these experiments was obtained initially from the Western Regional Research Laboratory of the USDA and subsequently from Merck & Company and the Commercial Solvents Corporation. On assay, the different lots of subtilin showed practically the same degree of potency.

Sensitivity Studies

In the N.C.A. laboratory tests, the first objective was to determine the sensitivity of the principal spoilage organisms to subtilin and mild heat. To accomplish this, subtilin was successively diluted in a nutrient medium favorable to the development of the test organism. The organism was added in equal concentration to all dilutions of the subtilin-media and the media incubated at suitable temperature for development of the organism. All tubes were sealed to prevent evaporation and were held until growth occurred or for at least eight months. With the exception of *Cl. botulinum*, all organisms tested were from an N.C.A. collection of cultures which had been isolated from spoiled canned food. The two strains of *Cl. botulinum* were from Dr. K. F. Meyer's collection at the Hooper Foundation for Medical Research, University of California.

The results of the tests in laboratory media and corn juice are shown in Table 1. The most striking observation to be taken from this table is the marked variation in the sensitivity of the different organisms to the action of subtilin. As a group, the thermophilic types are more sensitive than the mesophilic types. This is the reverse of findings on heat resistance

which show the mesophilic types to be more sensitive to heat. Within the thermophilic group, the flat sour types appear most sensitive to the action of subtilin, while in the mesophilic group, the putrefactive anaerobic types, which include *Cl. botulinum*, are the least sensitive. However, the effect of the subtilin does not persist over an extended incubation period. In most cases, growth occurs in tubes containing 10 ppm of subtilin after 60 days' incubation. Assay tests indicate loss of subtilin potency in tubes showing growth.

Assay Test

The marked initial sensitivity of the thermophilic flat sour organism to subtilin was utilized in a microbiological assay of the potency of subtilin under various test conditions. Dilutions of the subtilin to be tested were made in dextrose tryptone broth containing Brom-cresol purple as indicator. Spores of flat sour organism No. 1518 were added to a concentration of 30,000 per ml. After inoculation, the tubes were steamed for 5 minutes, cooled, and incubated at 55° C. for 72 hours. The tubes were then read and the last dilution showing growth was compared with controls of known subtilin concentration.

Inhibition vs. Destruction

A second important phase of the laboratory studies involved tests to determine whether subtilin acted in such a manner as to destroy the spoilage organisms or simply to inhibit them. Earlier findings in inoculated pack studies and sensitivity tests suggested inhibition. However, in order to test the assertion of the Bureau of Agricultural and Industrial Chemistry, of the USDA, that the subtilin-mild heat treatment is destructive to the spore, either initially or eventually as the spore undergoes germination, a series

TABLE 1

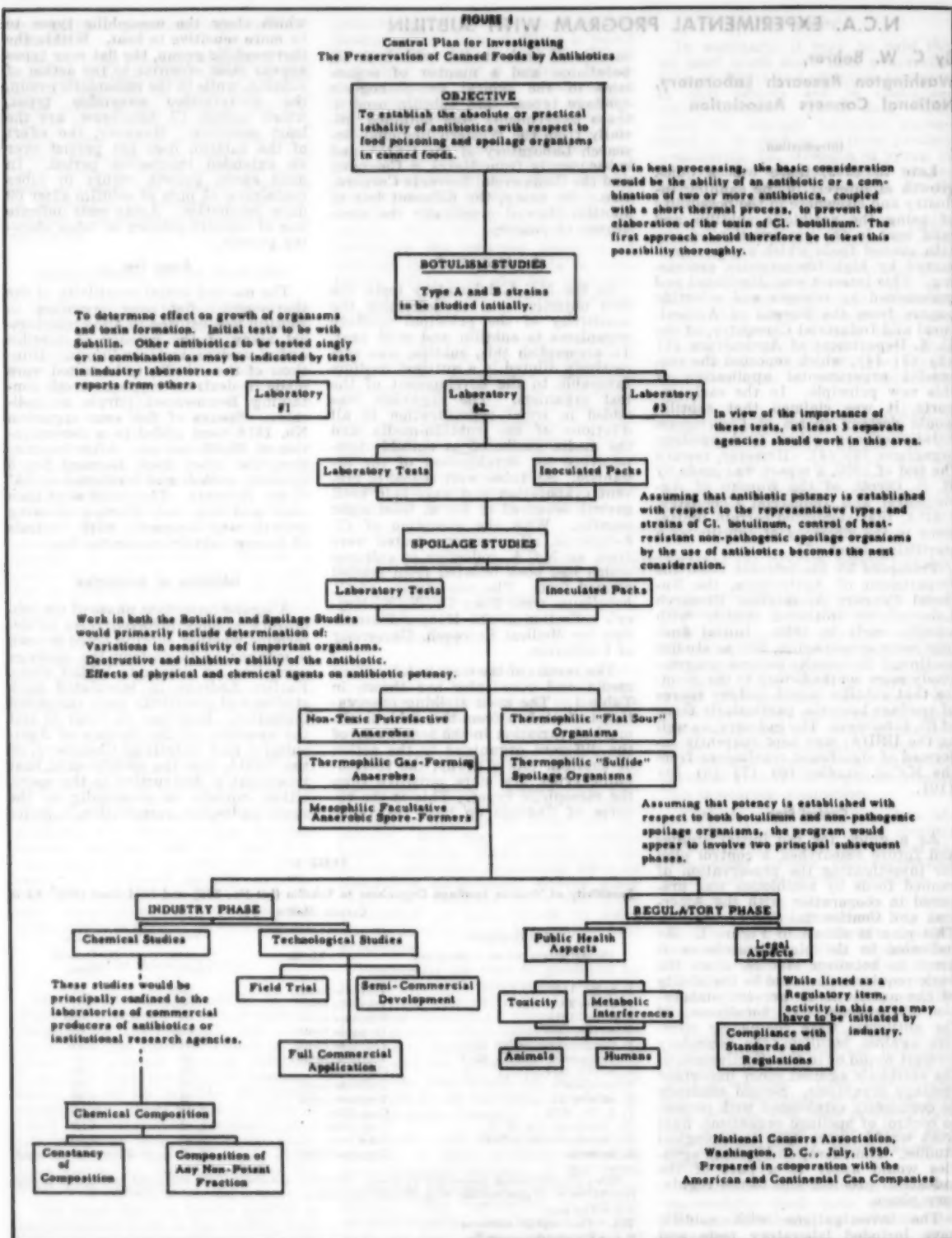
Sensitivity of Various Spoilage Organisms to Subtilin (Lot No. 326) and Mild Heat (205° F.) in Certain Media

Test Organism (30,000 spores per ml. of medium)	Media	Subtilin Concentration	
		Growth (ppm)	No Growth (ppm)
F. S. No. 1503	Tryptone broth	.005	.01
F. S. No. 26	Tryptone broth	.005	.01
F. S. No. 1518	Tryptone broth	.01	.025
T. A. No. 2283*	Tryptone broth	.025	.05
B. thermocidurans No. 2253	Tryptone broth	.025	.05
B. thermocidurans No. 43-P	Tryptone broth	.05	.50
T. A. No. 3814	Corn juice	.05	.10
B. circulans*	Tryptone broth	.05	.50
B. subtilis	Tryptone broth	.50	1.00
P. A. No. 3679	Corn juice	2.50	5.00
Cl. botulinum No. 62-A	Corn juice	2.50	5.00
Cl. botulinum No. 213-B	Corn juice	2.50	5.00
B. macerans	Tryptone broth	10.00	20.00 (growth 20 days)

Note: The incubation period was 72 hours. However, the above listed organisms have grown in concentrations of 10 ppm subtilin after 60 days' incubation, except as indicated by asterisk (*).

F. S. = Flat sour
T. A. = Thermophilic anaerobe
P. A. = Putrefactive anaerobe

FIGURE 1
Control Plan for Investigating
The Preservation of Canned Foods by Antibiotics



of tests was set up in the following manner:

Several subtilin concentrations were prepared in plain water and a pea infusion medium and spores of the test organisms added. The spore concentration used was sufficient to permit the recovery of viable organisms following serial dilution to a point where the subtilin concentration would be non-inhibitory. Organisms tested were N.C.A. flat sour organism No. 1518 and putrefactive anaerobe No. 3679. The pea infusion medium was recommended by A. A. Andersen, of the Western Regional Research Laboratory, USDA, in a personal communication. The medium contained the following components: Pea infusion, 33 percent; NaH_2PO_4 , 0.33 percent; Dextrose, 0.67 percent; Water, 66 percent. The pea infusion was prepared by steaming raw peas in an equal weight of water for 15 minutes and pouring off the resulting liquid. The final pH was 6.7 and sodium thioglycolate was added when anaerobes were tested.

Subsequent to inoculation, the plain water was held at room temperature and the pea infusion medium was incubated at 37° C. or 55° C., whichever was optimum for the development of the test organism. At intervals, one ml. quantities of the media containing the spores and subtilin were withdrawn and counts of the test organism made on dilutions in which the activity of the subtilin was reduced to a minimum. While there is some, as yet unexplained, reduction in the numbers of the test organisms subsequent to the initial subtilin mild heat treatment, the numbers detectable in non-nutrient medium remained relatively constant for as long as 105 days. In the pea infusion, the numbers of the test organism detectable remained fairly constant for a certain time, depending upon the test organism used, and then grew apparently without restriction, probably due to breakdown of the subtilin. Some typical findings with the flat sour organism No. 1518 are illustrated in Table 2.

Other avenues of investigation have been, and are being, followed in the laboratory to ascertain the extent and mode of action of subtilin and the effect of environmental conditions. Where applicable, the principal findings are included in the following report of inoculated pack studies.

Inoculated Packs

For the inoculated pack studies, peas, corn, chicken soup with rice, white potatoes, onions, cauliflower, broccoli, celery, sweetpotatoes, and tomato juice were selected to represent packs of products canned in large quantity and products not generally canned in large quantity because of quality damage during the required heat process. The inoculated packs of peas and corn were planned and executed in cooperation with the Research

TABLE 2
Effect of Subtilin and Mild Heat (205-212° F.) on Spores of Flat Sour Organism No. 1518 Suspended in Water and Culture Media

Subtilin Concentration (ppm)	Test Medium	Number of Organisms detectable* per ml. Test Medium after the following Hold Periods subsequent to the Heat Treatment (days)									
		0	1	3	7	9	14	17	21	103	
0	Water	100									
10	Water	100	60	60	60	60	120	120		100	
0	Pea infusion broth	1,160	16,000		3,500	negative growth phase					
10	Pea infusion broth	915	400		248	512	4,100		1,040	negative growth phase	

* Multiply figure shown by 1,000.

TABLE 3
Results of Subtilin-Mild Heat Processing * of Certain Food Products Inoculated with Spores of *Clostridium botulinum*

Product Packed and Can Size	No. of Botulinum Spores per Can	Subtilin Concentration (ppm)	Spoilage		Incubation Period (days)
			Cl. bot. #62-A (percent)	Cl. bot. #213-B (percent)	
Peas 211x304	1-2 million	20	100	70	180
		40	100	4	
Corn 211x400	1-2 million	20	100	24	140
		40	100	24	
		80	100	0	
	1,000	20	100	0	
Chicken Soup with Rice 211x400	100,000	20	96	25	22
		80	82		
	1,000	20	83		

* Processed 30-35 minutes at 212° F.

Note: Where spoilage developed, toxin could be demonstrated.

TABLE 4
Results of Subtilin-Mild Heat Processing † of Certain Food Products Inoculated with Spores of Typical Spoilage Organisms

Product Packed and Can Size	Organism Inoculated	No. Spores per Can	Maximum Concentration of Subtilin Used (ppm)	Spoilage (percent)	Minimum Time between Packing and Spoilage (days)
Peas 211x304	P. A. No. 3679	500,000	20	100	3
	F. B. No. 1518	240,000	40*	0	
	None		20	0	
	None		0	100	
Corn 211x400	P. A. No. 3679	500,000	20	100	1
	F. B. No. 1518	240,000	40	96	96
	None		20	0	
	None		0	40	
Chicken Soup with Rice 211x400	P. A. No. 3679	10,000	20	73	5
	None		20	0	
	None		0	0	
	None		0	0	
White Potatoes 307x409	P. A. No. 3679	500,000	20	67	7
	None		20	0	
	None		0	84	
	None		0	100	
Onions 307x409	P. A. No. 3679	500,000	20	100	7
	None		20	0	
	None		0	50	
	None		0	100	
Cauliflower 307x409	P. A. No. 3679	500,000	20	100	4
	None		20	0	
	None		0	100	
	None		0	100	
Broccoli 307x409	P. A. No. 3679	500,000	20	100	3
	None		20	17	
	None		0	100	
	None		0	100	
Celery 307x409	T. A. No. 3814	1,000,000	20	60	2
	None		20	34	
	None		0	84	
	None		0	100	
Sweetpotatoes 307x409	T. A. No. 3814	1,000,000	20	100	3
	None		20	0	
	None		0	100	
	None		0	100	
Tomato Juice 211x400	B. thermoacidurans	34,000	20	0	
	None		20	0	
	None		0	38	
	None		0	100	

†) Processes ranged from 10-35 minutes at 212° F.

* No flat sour spoilage occurred with 20 ppm subtilin.

Divisions of the American and Continental Can Companies.

The selected products were prepared for canning in accordance with the usual commercial methods or were obtained fully prepared but unprocessed and iced from a local cannery. The products were then canned with and without subtilin and with and without deliberate inoculation with the spores of typical food spoilage organisms. Inoculations with *Cl. botulinum* Types A and B were included in the peas, corn, and chicken soup packs. Where subtilin was added, it was mixed with the brine, water, syrup or the product itself to give 20 to 80 ppm actual potency based on the weight of the total can contents. A 20 ppm subtilin concentration was the highest used by the USDA investigators as reported in their original paper (3). Usually the cans were closed cold in a vacuum closing machine under 20 inches of vacuum. In the case of soup and tomato juice, the cans were closed at about 200° F. In several instances, the subtilin-brine mixture was added to the product under vacuum to enhance product penetration, but when no particular advantage was observed this practice was abandoned.

When the product was deliberately inoculated, the test organism used was one that would find the product most favorable for its development. The inoculum, which contained a previously determined number of spores, was added to the product, either before or after brining, to give the desired spore concentrations per can. The typical spoilage organisms used and the spore concentrations employed are shown in Tables 3 and 4. While the spore concentrations of the spoilage types used are not representative of those commonly encountered under commercial conditions, they are in line with those detected on rare occasions during bacteriological surveys. In the case of *Cl. botulinum*, the numbers of spores employed were on a par with numbers used in studies to determine the adequacy of heat processes.

The heat processes used in the present studies were of the order of 10 minutes to 35 minutes at 212° F. to give final center temperatures between 200° F. and 212° F. One lot of each product tested without subtilin received a process at a commercial level for quality comparison. Subsequent to the heat treatment, all cans were water cooled and incubated at temperatures which were optimum for the development of the test organism. Microbiological assays of the subtilin potency were made in test cans during the incubation period and on a number of cans from each lot in which spoilage developed. The assay method used was that previously outlined under laboratory tests. Toxicity tests were performed on at least two spoiled cans and finally on all remaining normal cans from each lot inoculated with strains of *Cl. botulinum*.

Inoculated Pack Results

The results of the subtilin-mild heat processing of peas, corn, and chicken soup inoculated with spores of *Cl. botulinum* are shown in Table 3.

The results of the packs indicate that the lowest concentration of subtilin used, namely 20 ppm, did not prevent growth and elaboration of toxin by *Cl. botulinum* Type A even with a spore concentration as low as 1,000 per can. With heavier inoculations up to 1 to 2 million spores per can, a subtilin level as high as 80 ppm was similarly ineffective. The findings with *Cl. botulinum* Type B were comparable except when tested in corn where high spore concentrations were inhibited during the incubation period by 80 ppm and low spore concentrations by 20 ppm of subtilin. Whenever growth occurred, botulinum toxin was demonstrated in representative cans by mouse inoculation, and, in a number of instances, antitoxin tests were made to confirm the mouse inoculation tests.

In Table 4, the results of the subtilin-mild heat processing of certain food products inoculated with spores of typical spoilage organisms are presented.

These results show that subtilin generally failed to maintain the preservation of a number of food products deliberately inoculated with spoilage types. The only exceptions were in the case of peas and tomato juice inoculated with spores of flat sour type organisms. In peas, the organism was simply inhibited, since it could be recovered in considerable numbers after nearly five months' incubation. In tomato juice, the flat sour organism *Bacillus thermoacidurans* was recovered after two weeks' incubation, but only in numbers markedly reduced from the original inoculum. The limited recovery from tomato juice indicates possible destruction of the acid-tolerant flat sour type.

Where no deliberate inoculation was made, 20 ppm of subtilin appeared sufficient to prevent spoilage in all products tested except broccoli and celery. However, it is noted that spoilage was not always complete even where subtilin was omitted and only the mild heat treatment employed.

The results of the microbiological assays to determine subtilin potency during storage of the test packs were somewhat erratic. However, the general indications are that subtilin loses its potency with storage and the rate of this loss appears to be influenced by the nature of the food product to which it is added and by the storage temperature. The rate of loss of potency was slowest in white potatoes and most rapid in corn. Loss of potency was more pronounced at 55° C. than at 37° C. The temperature effect is further emphasized by results of laboratory tests which show minimum

loss of potency at 5° C. and a much greater loss at 55° C. The loss appears to be greater in nutrient medium than in plain water. Laboratory tests have demonstrated also that loss of subtilin potency during storage is more pronounced at high pH levels. At a pH of 4.8, subtilin potency appeared to be unaffected directly by heat treatments as high as 60 minutes at 250° F.

Summary

A review of the findings from inoculated packs and laboratory tests furnishes substantial proof that the antibiotic, subtilin, used in conjunction with mild heat, will not prevent the growth of *Cl. botulinum* or the usual spoilage types in the low-acid canned foods which are preserved by high temperature sterilization.

Subtilin appears to be effective in inhibiting organisms responsible for flat sour spoilage in tomato juice. This observation offers only limited promise of technological use, however, because if subtilin were used as a supplemental agent in the preservation of acid products, its employment would be only as insurance against unusual contamination by spoilage organisms. These are now controlled without extraordinary treatment in conventional canning operations.

Although these studies have contradicted the promising results originally reported by the U. S. Department of Agriculture, the facts emerging from the subtilin investigation strongly encourage further exploration of the antibiotic field to discover an antibiotic that will accomplish what was claimed for subtilin.

References

- (1) Antibiotics Tested for Preserving Food, USDA Agricultural Research Administration Release, Dec. 29, 1949 (USDA 2766-49).
- (2) Research shows how Antibiotic Kills Food Poisoning Organisms, USDA Agricultural Research Administration Release, May 17, 1950 (USDA 1216-50).
- (3) Andersen, A. A. and Michener, H. D., "Preservation of Foods with Antibiotics. I. The Complementary Action of Subtilin and Mild Heat," (1950), *Food Technology* 4, 188-190.
- (4) Andersen, A. A. and Michener, H. D., "Effect of Subtilin on Bacterial Spores A29 (1950), *Bact. Proc.* 23-25.
- (5) Olcott, H. S., "Use of Antibiotics in Food Preservation," Paper read before the section on Functional Chemicals in Processed Foods, Division of Agricultural and Food Chemistry, American Chemical Society Annual Meeting, Sept. 5, 1950 (unpublished).
- (6) Food Preservation with Antibiotics, N.C.A. INFORMATION LETTER No. 1268, 2, Jan. 7, 1950.
- (7) Food Preservation with Antibiotics, N.C.A. INFORMATION LETTER No. 1267, 184-185, May 27, 1950.
- (8) Subtilin Preservation of Food, California Cannery Board Warns Against Present Use, N.C.A. INFORMATION LETTER No. 1261, 265, Sept. 2, 1950.
- (9) Association Issues Press Release on Subtilin—Efficiency of Subtilin Method of Food Preservation Not Yet Established, N.C.A. INFORMATION LETTER No. 1265, 237, Sept. 30, 1950.
- (10) Statement by E. J. Cameron of N.C.A. before House Committee to Investigate the Use of Chemicals in Food Products, N.C.A. INFORMATION LETTER No. 1314, 335, Dec. 2, 1950.

RESULTS OF STUDIES ON THE PRESERVATIVE ACTION OF ANTIBIOTICS IN PROCESSED FOODS

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Introduction

The canning industry bases its food preservation techniques on the use of heat sterilization. This principle involves heating the properly prepared food sealed in a container at a sufficiently high temperature for sufficient time to render the food free of ordinary spoilage organisms and all pathogenic bacteria. The process times and temperatures are based on measurements of heat penetration rate in each particular food and on studies undertaken to determine the thermal death time of the food spoilage organisms. The thermal death time must be related to the particular food under study since some constituents of foods exert either a bacteriostatic action or a bactericidal effect on some classes of spoilage organisms. Among these constituents are sugars in high concentrations, salt in relatively high concentration, and acids including acidic substances which regulate the natural pH of the vegetables of lower pH value.

Of course, the amounts of these food materials which may be purposely added to assist in the preservation of food are limited unless products of quite definite special characteristics are desired, such as pickles made from vegetables and jams from fruits. In the case of low-acid foods to be preserved in their natural or fresh cooked state, many substances have been investigated in the hope that a class of materials could be discovered which would prevent the growth of spoilage organisms without altering food quality characteristics and at the same time be unobjectionable from the standpoint of public health.

With the discovery of antibiotics, interest naturally arose as to what effect these biologically produced substances might have on food spoilage organisms. As early as December, 1943, a project was started in this laboratory to study possible food applications of penicillin. Since all available production of penicillin was reserved for the military, attempts were made to prepare small quantities in the laboratory. These efforts were not successful in producing adequate amounts of sufficiently potent penicillin, and the project was held in abeyance until commercial penicillin could be obtained.

In the meantime, Curran and Evans (1) had been working with penicillin as a possible agent for the preservation of milk, their full results being published in June, 1946 (2). They studied its sporicidal and sporicidal

action against 15 aerobic and 2 anaerobic spore suspensions inoculated into milk. Most of the species were sensitive to the penicillin and some were completely destroyed. However, four of the aerobes and both anaerobes (*Clostridium botulinum* and putrefactive anaerobe No. 3879) grew and produced spoilage of the milk. They concluded, "On the basis of this study, it is concluded that penicillin has no application in the preservation of food. In combination with mild heating, it might have utility as a preservative or spoilage delaying agent in certain nonfood materials."

During March, 1946, an inoculated pack of corn in brine using frozen whole grain corn was prepared at this laboratory to study the preservative action of penicillin against a typical heat resistant spoilage organism. The putrefactive anaerobe, N.C.A. No. 3879, was used as the inoculum and a concentration of 10,000 units of penicillin per 307 x 409 size can was added to the brine. All cans, including those prepared as uninoculated controls, swelled rapidly when incubated at 98° F. and the study was not carried any further.

Late in 1949, the U. S. Department of Agriculture released information about the work being done by Andersen and Michener (3) using antibiotics combined with a mild heat treatment as a mode of preserving vegetables with improved quality. The heat treatment was designed to inactivate enzymes, and destroy yeasts, molds and non-spore forming bacteria, leaving only the more highly heat resistant bacteria to be destroyed or prevented from growing by the antibiotics. Subtilin, aureomycin, chloromycetin, and lupulon were employed in preliminary studies with the work being concentrated upon the most promising, subtilin. These and later results have been reported by these same investigators (4) (5) showing that 5 to 20 ppm of subtilin accompanied by heating periods of 5 to 20 minutes in boiling water were capable in many instances of preventing spoilage of several vegetables even when inoculated with spores of the thermophilic flat sour organisms, *Bacillus stearothermophilus*. Some work was also done with a *Cl. botulinum* spore suspension with evidence of a destructive effect reported (5).

The work of Andersen and Michener aroused considerable interest in the canning industry. It was agreed that the criterion which must receive first attention in evaluating possible application of the subtilin-mild heat procedure to canning would be its ability to control *Cl. botulinum* under all conditions. An extensive cooperative project was developed under the leadership of the National Canners Asso-

ciation Washington Research Laboratory to study the efficiency of the subtilin treatment in controlling *Cl. botulinum*. In addition to work on the cooperative project, American Can Company's Research Division General Laboratory carried out some further tests with subtilin to determine whether there would be any merit in considering concentrations of the antibiotic higher than previously suggested. The entire field of the more important antibiotics was reviewed and several others whose properties indicated that they might act against spore forming food spoilage bacteria were also selected for study.

The work reported here covers *Cl. botulinum* inoculated packs of peas or corn with 40 and 80 ppm of subtilin and with single concentrations each of gramicidin, methylol-gramicidin, bacitracin and streptomycin. In addition, one pack of tomato juice inoculated with *B. thermacidurans* was made to determine whether subtilin might offer a means of controlling flat sour tomato juice spoilage.

Procedure

For convenience, a small size can, the 211 x 304, was used in all the inoculated packs. Vined and cleaned peas were obtained from a commercial canning plant and blanched in the laboratory. A weighed fill of 165 g. per can was used and the fill completed with 80 ml of 2 percent salt brine, or 80 ml total brine and antibiotic solution. After inoculation where desired, the cans were closed under 20 inches of vacuum, processed at 212° F. in water, and water cooled.

For the corn packs, cut and cleaned whole kernels of yellow corn were obtained from a commercial canning plant. Cans were filled at the laboratory with 150 g. of corn and 100 ml of 2 percent salt brine, or total of brine plus antibiotic solution. Closure and processing were the same as for the pea packs.

Listed below are the packs made with peas and corn:

Vegetable	Antibiotic	Concentration (ppm)	Process at 212°F. (min.)
Peas	Subtilin	40 and 80	35
Peas	Gramicidin	100	50
Corn	Bacitracin	40	40
Corn	Streptomycin	40	40
Corn	Methylol-gramicidin	100 and 200	40

These packs were incubated at 85° F.

Inoculum—The inoculum used consisted of a mixture of spores of 10 strains of *Cl. botulinum*, five of the strains being Type A and five, Type B. It was believed that if different strains of the organism varied in their susceptibility to antibiotics, the use of a mixed inoculum of this type would be the quickest way to cover this possibility. The stock suspension was diluted so that addition of 0.1 ml of the dilution resulted in an inoculation of 500,000 to 1,000,000 spores per can.

Antibiotic Solutions and Assays.—The concentration of antibiotic added to each can was based on the total contents of the can. Concentrated stock solutions were prepared so that a small quantity, usually 5 ml, would furnish the desired amount for each can. If the antibiotic received was not rated at 100 percent potency, compensation was made based on the reported potency to give a solution of 100 percent activity.

In order to check the potency of the antibiotics in inhibiting the growth of *B. stearothermophilus* (N.C.A. No. 1518), the assay procedure developed by the National Canners Association Laboratories was used on brine from sample cans after processing and cooling and during the course of incubation of the packs. Dilutions of the brine are added to dextrose tryptone broth with bromocresol purple indicator, maintaining a constant volume of 10 ml per tube. Each tube is inoculated with approximately 80,000 spores of *B. stearothermophilus*, heated 5 minutes at 212° F. and incubated 48 hours at 131° F. The potency in parts per million is obtained from the greatest dilution which prevents growth of the test organism.

Toxicity Tests.—As a matter of interest, toxicity tests were run on a portion of the swelled cans from lots inoculated with *Cl. botulinum*. In a few cases, toxicity was determined by feeding 5 ml of brine to a guinea pig. The other tests were made using intraperitoneal injection in mice to determine the type of toxin present. For these tests 0.5 ml of brine plus 0.5 ml of either Type A or Type B antitoxin were employed.

Tomato Juice Study.—For the work with tomato juice, product packed in enamel lined cans for about three months was used. The required amount of juice was mixed together and heated to 200° F. in a jacketed kettle. The hot juice was then filled into cans in which inoculum and/or antibiotic solution had been placed for various lots, using a total fill of 240 ml per 211 x 304 can. The cans were closed hot immediately after filling, processed 10 minutes at 212° F. in water, and water cooled. The cans were then incubated at 98° F.

Subtilin stock solution was added to the cans of tomato juice so that 40 ppm of subtilin resulted. The inoculum added was a spore suspension of *B. thermoacidurans* resulting in 12,000 spores per ml of tomato juice. Counts made after processing and cooling showed survival of 350 spores per ml of juice.

Results and Discussion

The lots included in each pack are shown in Tables 1 through 6 together with the spoilage results, toxin found where determined, and the assay potency of the antibiotic. These potencies are shown for selected intervals during the course of each experiment.

Table 7 summarizes the spoilage results found in this series of experiments.

The results obtained with each antibiotic included in the test packs are discussed in the paragraphs which follow:

Subtilin.—Table 1, covering higher concentrations of subtilin than have usually been suggested for preventing spoilage in vegetables, shows that as much as 80 ppm cannot be depended upon to prevent toxic spoilage in peas. At this concentration of the antibiotic, spoilage was delayed in some cans, spreading out over a period of almost three months. Both A and B strains of *Cl. botulinum* developed in these cans throughout the spoilage period. Considerable loss of potency of the antibiotic toward *B. stearothermophilus* was found in the swelled cans which developed in this lot.

TABLE 1

Subtilin Pack of Peas Inoculated with <i>Cl. botulinum</i>						
Lot No.	1	2	3	4	5	
Concentration of Subtilin (ppm)...	40	80	40	80	None	
Inoculated ¹	Yes	Yes	No	No	Yes	
No. Cans Packed....	24	24	12	12	12	
No. Cans Swelled....	24	24	0	0	12	
Percent Spoilage....	100	100	0	0	100	
Days to First Swell....	5	5	...	...	3	
Days to Last Swell....	5	87	...	...	3	
Toxin Present.....	A+B	A+B	Not run	B	B	
Assay Potency ² —when packed....	0.1	0.1	0.1	...	...
Assay Potency ² —First swell.....	0.1	>2.0	...	...	...
Assay Potency ² —3½ months....	2.0	>2.0	0.2	2	...	

¹ 500,000–1,000,000 spores per can composed of mixed strains of *Cl. botulinum*, 5 each Types A and B.

² Potency of stock solution of subtilin—0.01 ppm inhibited growth of *B. stearothermophilus*.

Gramicidin.—As shown in Table 2, gramicidin showed no inhibition whatever of *Cl. botulinum*, and even the control lot which was not purposely inoculated developed 100 percent spoilage in two days. Out of two cans from this lot sampled for guinea pig feeding tests, one was found toxic, apparently from chance contamination with *Cl. botulinum* spores.

TABLE 2
Gramicidin Pack of Peas Inoculated with *Cl. botulinum*

Lot No.	1	2	3
Concentration of Gramicidin (ppm).....	100	100	None
Inoculated ¹	Yes	No	Yes
No. Cans Packed....	20	10	10
No. Cans Swelled....	20	10	10
Percent Spoilage....	100	100	100
Days to First Swell....	2	2	2
Days to Last Swell....	2	2	2
Toxin Present.....	Toxic	Toxic	A
Assay Potency ² —2 Days....	2	>2	...

¹ 500,000–1,000,000 spores per can composed of mixed strains of *Cl. botulinum*, 5 each Types A and B.

² Potency of stock solution of gramicidin—1 ppm inhibited growth of *B. stearothermophilus*.

Methylol-gramicidin.—Similar results were obtained with the gramicidin derivative, methylol-gramicidin (see Table 3). With this antibiotic, one lot was run at 200 ppm without any noticeable inhibition of spoilage.

TABLE 3

Methylol-gramicidin Pack of Corn Inoculated with *Cl. botulinum*

Lot No.	1	2	3	4
Concentration of Methylol-gramicidin (ppm)....	100	200	100	None
Inoculated ¹	Yes	Yes	No	Yes
No. Cans Packed....	24	2	10	10
No. Cans Swelled....	24	2	10	10
Percent Spoilage....	100	100	100	100
Days to First Swell....	2	2	2	2
Days to Last Swell....	2	2	2	2
Toxin Present.....	A	Not Run	Toxic	Toxic
Assay Potency ²	0.2	Not Run	2	...

¹ 500,000–1,000,000 spores per can composed of mixed strains of *Cl. botulinum*, 5 each Types A and B.

² Potency of stock solution of methylol-gramicidin—2 ppm inhibited growth of *B. stearothermophilus*.

Bacitracin.—The results of a pack of corn using bacitracin at a concentration of 40 ppm are given in Table 4. Here again the lots with added antibiotic, whether inoculated or not, spoiled at the same rate as the inoculated control.

TABLE 4

Bacitracin Pack of Corn Inoculated with *Cl. botulinum*

Lot No.	1	2	3	4	5
Concentration of Bacitracin (ppm).....	40	40	40 ²	None	None ¹
Inoculated ¹	Yes	No	Yes	Yes	Yes
No. Cans Packed....	24	11	15	10	10
No. Cans Swelled....	24	11	15	10	0
Percent Spoilage....	100	100	100	100	0
Days to First Swell....	4	4	4	4	...
Days to Last Swell....	4	18	4	4	...
Toxin Present.....	A+B	A+B	Not Run	A+B	...
Assay Potency ²	0.2	2.0	Not Run	Not Run	...

¹ 500,000–1,000,000 spores per can composed of mixed strains of *Cl. botulinum*, 5 each Types A and B.

² Potency of stock solution of bacitracin—0.1 ppm inhibited growth of *B. stearothermophilus*.

³ The peas had been soaked for 24 hours in a 10 ppm solution of bacitracin at refrigerator temperature prior to packing.

⁴ Process—20 minutes at 230°F.

TABLE 5

Streptomycin Pack of Corn Inoculated with *Cl. botulinum*

Lot No.	1	2	3
Concentration of Streptomycin (ppm).....	40	40	None
Inoculated.....	Yes	No	Yes
No. Cans Packed.....	24	12	10
No. Cans Swelled.....	24	6	10
Percent Spoilage.....	100	50	100
Days to First Swell.....	4	4	4
Days to Last Swell.....	4	50 ^a	4
Toxin Present.....	A+B	Toxic	A+B
Assay Potency ^b	3.75	2	...

^a 500,000-1,000,000 spores per can composed of mixed strains of *Cl. botulinum*, 5 each Types A and B.

^b Potency of stock solution of streptomycin—1 ppm inhibited growth of *B. stearothermophilus*.

^c Six cans have not swelled during 4½ months' incubation.

Streptomycin—The results shown in Table 5 do not indicate any inhibiting effect of streptomycin against spoilage by the inoculated *Cl. botulinum* spore suspension. This antibiotic was more effective, against the natural bacterial flora of the products used, than any of the others tested with the exception of subtilin. However, 50 percent of the uninoculated cans swelled including one can that showed toxic spoilage when fed to a guinea pig.

Subtilin with Tomato Juice—Work which has been done with subtilin tested against pure cultures and with inoculated subtilin packs has indicated that a strain of thermophilic bacteria which causes flat sour in low-acid vegetables is quite sensitive to the antibiotic. It was thought that if *B. thermoacidurans*, the facultative thermophilic organism which causes flat sour in tomato juice should have this same sensitivity, subtilin would have a possible application in furnishing an additional means of controlling this type of spoilage. Other organisms causing spoilage in tomato juice are of relatively low heat resistance, so that tomato juice can be protected from spoilage other than the flat sour type by boiling water processes which would not destroy the potency of the antibiotic.

TABLE 6

Subtilin Pack of Tomato Juice Inoculated with *B. thermoacidurans*

Lot No.	1	2	3
Concentration of Subtilin (ppm).....	40	40	None
Inoculated.....	Yes	No	Yes
No. Cans Packed.....	20	10	15
No. Cans Checked for Spoilage.....	8	4	11
No. Cans Spoiled.....	0	0	8
Percent Spoilage.....	0	0	73
Days to First Spoilage.....	0	0	18
Assay Potency—18 Days.....	0.01	0.01	..
Assay Potency—3 Months.....	0.01	0.01	..

^a 12,000 spores per ml in can. Survival count of 350 spores per ml after processing and cooling.

^b Potency of stock solution of subtilin—0.01 ppm inhibited growth of *B. stearothermophilus*.

Summary of Spoilage in Inoculated Antibiotic Packs

Antibiotic	Product	Concentration (ppm)	Inoculum	Spoilage (percent)
Subtilin	Peas	40 and 80	<i>Cl. botulinum</i>	100
Subtilin	Peas	40 and 80	None	0
Gramicidin	Peas	100	<i>Cl. botulinum</i>	100
Gramicidin	Peas	100	None	100
Methylol gramicidin	Corn	100 and 200	<i>Cl. botulinum</i>	100
Methylol gramicidin	Corn	100	None	100
Bacitracin	Corn	40	<i>Cl. botulinum</i>	100
Bacitracin	Corn	40	None	100
Bacitracin	Corn (soaked)	40	<i>Cl. botulinum</i>	100
Streptomycin	Corn	40	<i>Cl. botulinum</i>	100
Streptomycin	Corn	40	None	50
Subtilin	Tomato Juice	40	<i>B. thermoacidurans</i>	0
Subtilin	Tomato Juice	40	None	0
Subtilin	Tomato Juice	None	<i>B. thermoacidurans</i>	73

The results of the preliminary test pack of subtilin in tomato juice are shown in Table 6, and indicate that subtilin at 40 ppm is preventing the growth of *B. thermoacidurans*. Whereas spoilage was found in inoculated controls (Lot 3) starting after 18 days' incubation and has developed in 73 percent of 11 cans which have been opened for spoilage examination, none of the 8 cans which have been opened at intervals over a 2-month period from the inoculated lot containing subtilin (Lot 1) have become flat sour. The antibiotic has retained high potency during 3 months' incubation. In addition, subculturing of cans when opened for examination has failed to recover the test organism after 30 days, when the first cans of Lot 1 were examined. This would indicate that subtilin may have a completely destructive effect on this species.

The remaining cans in this pack are being retained to determine whether longer incubation may result in any delayed spoilage. Of course, many phases of this possible application of subtilin need to be worked out experimentally before its use on a commercial scale could be considered. Of utmost importance are the public health aspects which have been discussed in detail elsewhere. No substance of this kind should be added to foods until all authorities and regulatory bodies are agreed that it may be safely used.

Other experimental phases include determination of the smallest concentration which would prevent spoilage, whether the effect of the subtilin is actually one of sterilization or merely inhibitory, and whether any strains of *B. thermoacidurans* are resistant. It is planned to carry out further work along these lines.

Summary

Experimental inoculated packs of peas or corn in brine were prepared using the following antibiotics in con-

junction with processing at 212° F.: Subtilin, gramicidin, methylol-gramicidin, bacitracin, and streptomycin. The packs were inoculated with a spore suspension of *Cl. botulinum* containing 5 strains each of Type A and Type B. Subtilin in a concentration as high as 80 ppm permitted 100 percent spoilage in inoculated lots with both Type A and B toxins found present. The same results were obtained with the other antibiotics tested in a single high concentration. None except subtilin even controlled the natural bacterial flora of the vegetables.

Subtilin and a mild heat treatment were used for an experimental pack of tomato juice inoculated with spores of *B. thermoacidurans*. No evidence of flat sour spoilage has been found in the tomato juice which contained 40 ppm of subtilin. Subculturing of treated samples indicates that subtilin may have a destructive effect on this organism.

Acknowledgment

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Bibliography

- (1) Penicillin as a preservative. *Chem. Eng. News*, 33: 1622. (1945).
- (2) Curran, Harold R. and Evans, Fred R. The activity of penicillin in relation to bacterial spores and the preservation of milk. *Jour. Bact.*, 52: 89-98. (1946).
- (3) Food preservation with antibiotics. INFORMATION LETTERS. National Canners Association. No. 1268: 2. (Jan. 7, 1950).
- (4) Andersen, Ariel A. and Michener, H. David. Preservation of foods with antibiotics. I. The complementary action of subtilin and mild heat. *Food Tech.*, 4: 158-160. (1950).
- (5) Andersen, Ariel A. and Michener, H. David. Effect of subtilin on bacterial spores. *Bact. Proc.*, 1950, p. 23.

PROBLEMS IN THE APPLICATION OF ANTIBIOTICS TO FOOD PROCESSING

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The use of new preservatives in foods has always been regarded with suspicion because of the possibility that, with long-continued ingestion, they may have deleterious effects on consumers. The antibiotics, however, open a new field for research because as a class they are relatively non-toxic to mammals although remarkably effective as bactericidal and bacteriostatic agents. The work of Curran and Evans (*J. Bact.*, 52, 89, 1946) with penicillin and milk was the pioneer effort in this field. Workers at the Western Regional Research Laboratory reported last April that subtilin appeared to have promise as a food preservative, inasmuch as small amounts (10 to 20 ppm) combined with a brief heat treatment (10-20 min. at 212° F.) preserved uninoculated packs of some vegetables (Andersen and Michener, *Food Tech.*, 4, 188, 1950). Subtilin is a polypeptide, digested by proteolytic enzymes, and non-toxic to rats when fed over long periods of time. No known medical use was in prospect; hence the development of resistance to subtilin by disease-producing organisms did not require immediate consideration.

The following is a progress report of work done along some of the lines that will require attention before the use of subtilin (or other antibiotics) could be considered practical.

In May, 1950, Gerber Products Company collaborated with us in a test in which an inoculated pack of pea puree was canned with subtilin. Each 4½ oz. can contained 10,000 spores of P.A. No. 3679. Amounts of subtilin up to 20 ppm and cooks up to 20 min. at 212° F. were used. There was substantial spoilage in each lot although the cans containing most subtilin did not spoil as quickly as the others. These and other results at the Western Regional Research Laboratory and those that were being obtained at the National Canners Association Laboratories at the same time suggested that a more fundamental approach to the problem was required.

In order to be effective, antibiotics, or any preservatives, must either kill or maintain stasis in spores or vegetative forms once germination occurs. In general, subtilin appears to kill spores only when they have begun to germinate. If the process of germination could be made rapid and complete, and if all organisms were sensitive, subtilin could effectively sterilize the product.

Methods for inducing rapid spore germination have received attention. Dr. A. A. Andersen found that the addition of bicarbonate to otherwise

complete media induces rapid germination of botulinum spores in anaerobic plates. This improved method for making counts has expedited research, but the addition of bicarbonate to subtilin-containing packs has not yet been found to enhance keeping quality.

In detailed investigations on the effect of subtilin with and without heat treatment on various food spoilage organisms, we have encountered strains both sensitive and resistant to very small amounts of subtilin. Of particular interest was the difference observed between a culture of *B. stearothermophilus*, No. 1518, with which we had been working and one used by the National Canners Association Laboratories. The latter was much more resistant to subtilin.

Many experiments have shown that with any one organism, the larger the inoculum the greater the amount of subtilin required to prevent spoilage. Whatever antibiotic is eventually considered for use, some decision will be required as to the greatest number of spores that will have to be taken care of.

Peas and milk seem to contain substances which neutralize subtilin. For example, organisms will grow in evaporated milk or pea puree in the presence of concentrations of subtilin

which otherwise inhibit growth. It has been suggested that the fat particles in milk may be responsible for this effect.

In contrast to other commodities, cans of potatoes which had been inoculated with P.A. 3679, *B. subtilis*, and *B. stearothermophilus*, and heated 10 to 20 minutes at 212° F. in the presence of 20 ppm subtilin did not spoil in eight months, although they still contained viable spores. The mechanism by which this was achieved will receive further study.

The gradual deterioration of subtilin during storage is a disadvantage, if residual spores remain viable. Search for an equally effective antibiotic more stable toward heat and storage is being carried out at the Northern Regional Research Laboratory. So far, more than 5,000 bacilli have been screened for the ability of the isolates to inhibit the growth of food spoilage organisms. Of these, about 130 cultures have now been selected for flash culture studies and approximately half of these have been tested for antibiotic production. Possibly 26 will be found to produce sufficient antibiotic in liquid culture to warrant purification studies. Work on promising antibiotics from *B. cereus* and *B. laterosporus* is being initiated. It is hoped that such studies will eventually reveal antibiotics which will have greater potential value in food preservation than those so far investigated.

SESSION ON ADDED CHEMICALS

PROGRESS IN FOOD PRODUCTION AND THE PROTECTION OF THE PUBLIC HEALTH

By H. Thomas Austern,
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Frequently there is far-reaching significance in the queries of the young. You will all remember the old story of the city child who wondered how cows could possibly sit on pint-sized milk bottles. Yet this absurdity perhaps epitomizes the basic change in the production and distribution of food products that underlies the problems we are to consider today.

For the past five decades have witnessed the development of packaged foods. Increased urbanization, vast changes in our ways of living, the entry of women into the business world and the arts, and many other causes have contributed to the present-day production, distribution, and retail sale of practically every food in small unit packages. Most important, however, have been the expanded variety of our modern diet and the vastly increased distances from which our daily food purchases are drawn.

With the passing of the cracker and pickle barrels, the large sack of flour, the home baking of bread or curing of ham, and dependence upon locally-grown fruits and vegetables available only during harvest time, have come the multitude of canned foods, the precooked cereal, and the off-season distantly-grown tomato and strawberry brought to you wrapped in cellophane. It is not extreme to suggest that this inexorable trend toward the producer-prepared food in small-sized consumption packages may some day see the end of the fruit and vegetable counter and the local butcher shop or fish market.

Yet, sweeping as have been the changes made by packaged foods in methods of distribution, important as have been the contribution to better living of the more varied diet they offered, and as valuable as have been the concomitant improvements in the processing and container arts, this new pattern has also brought striking changes in the legal rules controlling

the production and sale of food products.

The old rule of caveat emptor—let the buyer beware—has given way to the direct legal action by an injured consumer against any original manufacturer chargeable with negligence. The historic thumb on the grocery store scale and the "baker's dozen" have been replaced by required declarations of net weight. What is stated on the label—or additionally asserted in an advertisement—are required by law to be true. For many foods a federal standard of identity legally controls the composition of the final product.

The area we are invited to explore this morning is only another sector of this advancing front. With the development of centralized production—and to some extent the mass production—of food products has come the scientific reexamination of the purpose and functioning of many food ingredients. There has also been a consequent progress in the improvement of food products. As a familiar example, the addition of small quantities of calcium salts to canned tomatoes has given the consumer a more useful product.

Similarly, the development of organic pesticides has permitted the bringing to harvest of better and more abundant fruits and vegetables. The introduction of anti-oxidants, of emulsifiers, of coagulants, and of various inhibitory agents has often afforded the consumer not only a more palatable product but also a more economical one through the elimination of waste or other household loss.

Yet not all changes are improvements. The substitution of one ingredient for another may result only in a concealed cheapening or debasement of the food. Even where lower food values are not wholly involved, the new ingredient may challenge the economic position of existing suppliers—as the controversies about oleomargarine, diglyceride shortening, and surface active ingredients have demonstrated. But vitally important—and unrelated to economics—is the threat to the public health in the continuous ingestion, even at low levels, of new ingredients which may turn out to be chronically toxic.

Since most of the new developments in the growing or processing of foods involve the use of highly refined or newly synthesized substances, this public health problem is popularly and Congressionally termed "Chemicals in Food Products," or the use of "chemical additives." I prefer the original concept of a "poisonous or deleterious" ingredient which is the language used in the Act.

Perhaps, too, you will agree that it serves no useful purpose to attempt, as many do, to draw a distinction between "natural" and "unnatural" food ingredients. The eating of grasshoppers may be natural to some and

repulsive to others. There was a time, we are told, when the tomato was regarded as poisonous.

Moreover, there is no real basis for assuming that everything we are accustomed to eating is necessarily wholesome. As a recent witness before the Delaney Committee suggested:

"From the point of view of chronic toxicity of foodstuffs, the centuries-old experience of mankind does not have as much value as appears at first sight. Who knows that some common diets do not contain cancer-producing agents? Who knows that if we could eliminate certain foodstuffs from the diet we would not considerably lessen the incidences of diseases of the blood vessels, of the liver, and of cancer? If nutritionists had the time, facilities, and the inclination to study such problems, it would be interesting to feed rats, for their life span, a large number of staple food articles which are now considered completely innocuous."

Nevertheless, for at least the past 40 years, and longer in Canada, it has been generally recognized that it is an appropriate function of government to prohibit the addition to food products of ingredients that are poisonous or deleterious where their use may be injurious to health. The present inquiry concerns the manner and mode of prohibition—whether there should be freedom to utilize any ingredient subject only to prosecution if it should turn out to be harmful, or whether the use of a new ingredient shall be barred until its safety is pre-determined. A necessarily related question is who should finally determine the issue—a court or jury in the event of prosecution or seizure, or an administrative agency?

These legal issues were brought into acute focus soon after the end of World War II by a series of seemingly unrelated events, some of which warrant review because they so vividly illuminate the problem.

Early in 1947 Sir Edward Mellanby in England discovered that the feeding of bread made from flour treated with nitrogen trichloride produced canine hysteria or running fits in dogs. Nitrogen trichloride under the name Agene had been used for almost 30 years as an accelerating agent for the maturing of flour. Indeed, its use had been recognized in the federal standard of identity. But with the confirmation of the Mellanby experiment, and even absent any evidence that the substance might cause like effects in humans, the milling industry, the bakers, and the manufacturer of Agene cooperated in amending the flour standard so as to outlaw its use.

When administrative hearings were resumed on bread standards in 1949, there was brought to light the use of so-called surface active agents or bread softeners. Considerable argument, as yet unresolved, developed as

to whether these substances were or were not toxic at the levels employed. Significantly, their use permitted a baker to employ less vegetable or animal shortening. Toxicity aside, this most certainly excited the interest of the meat industry and farm groups.

Meanwhile, the widespread use of DDT led to the discovery of its storage in the fat of warm-blooded animals and its appearance in milk even from the spraying of dairy cattle. The multitude of new and potent pesticides—highlighted by the occasional death of those who applied them—raised warranted concern about the effect of possible toxic residues. Dramatic discoveries as to the effect of mineral oil on oil soluble vitamins and the acute toxicity of monochloroacetic acid led to positive action by the Food and Drug Administration.

Not the least of the contributing causes of Congressional inquiry have been the formal Food and Drug pesticide hearings. The background of these was canvassed by this group last year in Atlantic City. Throughout almost an entire year 246 witnesses talked over six million words, with reference to some 1,300 exhibits, in order to bring to light the effect of over 150 different chemicals in combatting the ravages of several thousand plant pests and diseases upon the production of every commercially grown fruit and vegetable. If it did nothing else, this public record demonstrated the magnitude of the over-all pesticide problem.

Last June a special Select Committee To Investigate the Use of Chemicals in Food Products was authorized by House Resolution 323. The Committee appointed, popularly known as the Delaney Committee, consisted of two medical doctors, an industrial chemist, a newspaper publisher, and, inevitably, three lawyers. This committee of Congress soon acquired a competent staff. Extensive hearings were held over a period of three months, and a printed record of almost 900 pages developed.

Mr. Greenleaf is going to give you further detail about these Delaney Committee hearings. The Committee has thus far reached three conclusions:

First, that "the increasing use of chemical additives in the production and processing of food has raised a serious problem as far as the public health is concerned."

Second, that the existing federal laws dealing with the use of chemicals in food are not adequate to protect the public against the addition of unsafe chemicals.

Third, that while "unnecessary obstacles to technological improvements in food production and processing" should not be created, nevertheless the Federal Food, Drug and Cosmetic Act should be amended to require that no chemical or synthetic ingredient be permitted to be used until its safety

has been established to the satisfaction of the FDA.

Yet in view of the far-reaching consequences of any such amendment, the Committee finally concluded that everyone interested should be given a further opportunity to comment on any proposed legislation.

Necessarily, the first task in dealing with any proposed statutory amendment is to consider how the present law operates. No one builds a new wing to his house without determining how it will supplement and connect with the existing structure. If cross-purposes, and even direct contradiction, are to be avoided, any thinking about a new amendment must be based upon an examination and understanding of the present statutory edifice.

To begin with, the present law specifically and clearly prohibits the addition to any food of any poisonous or deleterious substance "which may render it injurious to health." This is the basic Section 402(a)(1)—the so-called (a)(1)—adulteration prohibition.

It operates, however, completely after the fact. Anyone may add any ingredient to any food product, and anyone may sell a product containing any poisonous residue, if he is satisfied that—or even if he does not bother to inquire whether—the particular level of use is non-injurious. It is up to the government to establish in its prosecution or seizure that the product is both "poisonous or deleterious" and that at the particular level of use it may injure health. This is a substantial burden of proof, and in a criminal case must be beyond a reasonable doubt.

There is, however, one other weapon in the public health arsenal turning on proof that the added ingredient is poisonous and its use unnecessary.

For reasons which I suggested in the pesticide discussion last year, Congress in 1938 recognized that in the case of pesticides some balance would have to be administratively fixed between the necessary use of certain admittedly poisonous pesticides and the protection of the public health. This process is familiarly known as the establishment of residue tolerances.

Congress did so by independently providing in Section 402(a)(2)—and its corollary Section 406—that if any poisonous or deleterious substance were added to any food and its addition was not required in the production of that food, or could be avoided by "good manufacturing practices," its employment would be deemed as adulteration. Only where the FDA determined in a proceeding under Section 406 that its use was required and unavoidable—and established permitted tolerances—could the added poisonous ingredient supposedly escape these sections.

Yet except for one unsatisfactory attempt to control spray residue levels on apples, it was not until 1949 that comprehensive hearings were scheduled on pesticides. These but recently concluded and only the most optimistic participant believes that residue levels will be officially promulgated before the end of 1951. Even when issued, they will cover only fresh fruits and vegetables.

Absent a tolerance under Section 406, following a hearing in which toxicity is examined, the only remaining legal deterrent is possible FDA action under Section 402(a)(2) after the product is shipped. To support a seizure or prosecution under Section 402(a)(2), the government has to establish that the added ingredient is either poisonous or deleterious and that its use is unavoidable. Except in extreme cases, such as the use of a fluoride as a preservative in beer, this has been a difficult task. Nor has the burden been lessened in those cases where clear evidence either of poisonous character or of complete safety is lacking.

Necessarily, prosecution could be undertaken only after some data as to acute or chronic toxicity was secured, and apprehension existed as to whether the limited number of FDA personnel and its modest budget could ever keep up with the expanded use of new chemical ingredients and the difficulties of their detection.

This is not to say that every newly developed ingredient is toxic. Admittedly, many are not. Suppliers in many instances, and extensively in the pesticide field, have made their own investigations of acute and chronic toxicity. Others have informally cleared with the FDA the proposed introduction of new ingredients.

Yet in a good number of instances many new substances were widely marketed and their use only later brought to light in standard-making proceedings. The fear existed—deeply felt by many and considered exaggerated by some—that error might mean, not necessarily a dramatic series of deaths from acute poisoning, but widespread public injury through the ingestion over long periods of time of materials of chronic or cumulative toxicity.

As I have repeatedly suggested, the burden on the responsible canner was onerous. He often did not know which of the many pesticides his grower might employ. In some instances, not only was knowledge of relative toxicity lacking but there was also no positive method for quantitative detection of possible residues. Yet the processor remained legally responsible—and certainly answerable to the consumer—for the finished product.

Both as to residues and direct ingredient additions, to the degree that any newly developed substance was used in a staple food eaten daily, such as bread or dairy products, the danger was felt to be greatly enhanced.

Of course, whenever a food came to be standardized, the permitted use of every ingredient came into question. If doubt existed as to its wholesomeness, evidence on this point was taken. Yet this procedure was believed to be both too burdensome and too late. Often the testimony and argument about the toxicity of minor ingredients overshadowed the rest of the standard hearing, and imposed a real burden in time and cost upon those not overly interested in their use.

Inevitably, the more widely an ingredient had come to be commercially employed, the stronger would have to be the showing of its deleterious potentialities before it could be outlawed. By the same token, even a convincing demonstration of danger to the public health would come only after very considerable actual usage.

Out of all of this has emerged the Delaney Committee conclusion that the present law is inadequate and that the Act should be amended to provide for the prior administrative clearance of any "chemical additive." Thus far the only draft amendment has been that tentatively advanced by the FDA.

The pattern sought to be followed is that of the "new drug" section of the law which was belatedly added in 1937 following 93 deaths from a solution of sulfanilimide in diethylene glycol, marketed as "Elixir of Sulfanilimide." No new drug could be marketed until after FDA approval of an application furnishing full information as to its composition, its safety, methods of manufacture, proposed labeling, and other pertinent data. A "new drug" was defined as one "not generally recognized" by qualified experts as safe for use under the conditions prescribed, or any drug otherwise considered safe but whose use had not been investigated sufficiently for the new use.

In evaluating the proposed extension of this new drug provision to foods, few will quarrel with the basic principle that any new ingredient whose safety is not generally recognized should be pretested prior to its use in food. But agreement as to principle merely exposes for further study some of the perplexing questions involved. Since many qualified hands, both in and out of government, will be hard at work in resolving these problems, my task is largely to expose them.

The first job is to define the types of ingredient to be brought under this method of control without firing a statutory blunderbuss that may stymie progress in the development of new and wholly safe food products. Present thinking limits prior clearance to a "chemical additive." This is defined to embrace three groups of ingredients:

First, any substance intended to preserve or alter any food or any characteristic of the food;

Second, any substance to be used, wholly or in part, as a substitute for any food ingredient; and

Third, any substance used as a pesticide, or for any other purpose in the production, processing, packing, or holding of any food where contamination is likely to result.

Any substance falling within these three categories will require prior clearance wherever it is not generally recognized by qualified experts as having been adequately tested to show that it is not poisonous or deleterious.

Even the casual reader will immediately discern that, although titled to embrace only a "chemical additive," the proposed definition is far-reaching. It avoids the argument that all things are essentially chemicals by shifting the controlling noun from "chemical additive" to "substance." The definition of a "substance" is embracing. Any ingredient added to any food will, to some extent, alter its characteristics. To some degree the use of one ingredient may permit lesser amounts of another, and thus constitute a substitute. Hence the residual and really controlling test is whether the "substance," or ingredient, is generally recognized by qualified experts as not being poisonous or deleterious when used in food.

Presumably, if the proposed ingredient is found to be universally and completely wholesome, this will end the inquiry. In this rare instance, it is doubtful whether an application will be needed.

But generally, perhaps you will agree, toxicity is a function both of composition and level of use. In sufficient quantities, many commonly used substances can kill. A new ingredient may be harmless except in quantities which a consumer would reject and which would have literally to be forced down a man's gullet. In this sense, the concept of a "poisonous or deleterious" ingredient may have to be given a popular rather than a scientific meaning.

Hence in most cases the basic question controlling the administrative determination to approve or to reject may turn on the composition of the ingredient, the level of its intended use, and the characteristics of the food product in which the new substance is to be employed. It is not wholly clear that these inquiries are fully focused in the proposed amendment. The information required to be filed covers composition, ingredient samples, methods of analytical detection, and necessary data on toxicity. The application must in addition contain "all directions, recommendations, and suggestions proposed for the use of such chemical additive."

Yet nowhere in the proposal is there an attempt to define "poisonous or deleterious." Curiously, these key words have never been defined in any earlier or in the present Food and Drug Act. Judicial gloss—usually

pertinent only to the particular case—has brought merely such generalities as any substances having "a tendency to destroy the vitality of the human body."

Yet I doubt that any redaction of scientific definitions would be practicable for legislative purposes. One man's meat will still remain another's poison. In determining—even by qualified toxicologists—when the intended use of an ingredient would render it "poisonous or deleterious," common sense must remain the touchstone of good administration.

Moreover, the relation of the proposed new amendment to other sections of the Act will have to be more carefully considered. As Deputy Commissioner Crawford has pointed out, even a wholesome ingredient may be so employed as to constitute adulteration. To illustrate the obvious, the addition of even chemically pure water to canned tomato juice would be unlawful. By the same token any ingredient whose use was cleared under the new amendment might still be employed to conceal damage or inferiority, or to constitute an improper substitution under Section 402 (b). That section, you will recall, likewise prohibits the addition of any substance which increases the bulk or weight, or reduces the quality or strength, or makes a food product appear to be of greater value than it is.

This problem of the future use of a certified ingredient as an economic, rather than as a toxic, adulterant is pointed up by the use of somewhat parallel language both in Section 402 and in the proposed new chemical additive amendment. As to over-all propriety of use, a collateral problem may be found in those cases where the application for clearance seeks to cover an entire class of foods. Even where the nontoxicity—that is the wholesomeness—of a new ingredient to be used at particular levels, can be certified, it is well established that other considerations may operate in determining whether that use will ultimately be recognized in a standard of identity. As an illustration, you have the fact that benzoate of soda is recognized in the oleomargarine standard but has been prohibited in tomato catsup. Manifestly, prior clearance under the new amendment will not automatically mean the acceptance of any new ingredient for all possible food uses.

Even more troublesome is the inevitable likely confusion between the new proposal and Section 406—which authorizes the hearings for the determination of permitted residue levels. The proposed amendment suggests, both in its definition of a chemical additive and in the information required to be filed, that even an ingredient which is admittedly poisonous or deleterious may still be permitted if its use is required in the production of a food. In these cases,

the new amendment calls for the production of residue data when the application is filed.

This may raise a host of problems whose practical impact will have to be resolved. Lest the technical interrelation of the various statutory provisions bog you down, let me leave with you a single illustration:

A chemical manufacturer may in the future develop a new pesticide. It may be fully as effective and yield equivalently low residue levels as some already recognized pesticide. Yet its toxicity may be far less, and considerations of public health would permit residue levels twice those of the comparable substance. Under Section 406 the *required level of use* for crop production—and the resulting permitted residue tolerance—need not be coextensive with *levels of safety*. Put another way, the permitted tolerance for use of a poisonous substance as a pesticide is supposed to be only to the extent that its use is required.

When the manufacturer applies under the proposed new amendment, it would appear that the only relevant question will be to determine the residue levels of the new pesticide that mark the line of no health hazard. But this, under present interpretations of the existing law, as I understand them, does not necessarily mean that these levels will clear the hurdle of Section 402(a)(2). As we have seen, that section, together with 406, permits usage only to the extent recognized as necessary for production or unavoidable in good manufacturing practices.

If these problems I have outlined are not clearly resolved, there may inadvertently be a popular misconception as to how far the proposed amendment will go. It will not mean that once a new pesticide is approved, any product in which its residue may be found will likewise always be lawful. It will not end for the grower or the processor all questions about its lawful presence in the harvested fruit or vegetable, or in the canned product. It will not avoid for the future the necessity for further hearings under Section 406 for the establishment of permitted tolerances in that fruit or vegetable either in raw or processed form.

Nor will the new amendment in any way be concerned with some of the side effects with which many of you are familiar. It will not resolve the question whether the use of the newly cleared substance in particular food products might not produce off-flavors which would render them subject to seizure.

Much argument has been engendered as to whether any new amendment should leave the final determination of these questions of toxicity to the FDA. Extensive debate has been had as to whether it would not be preferable to create some inde-

pendent board of experts to make these investigations, or to establish some other form of advisory board to act as a check on feared arbitrary administrative action. These matters remain for Congress.

There is, however, one point on which a lawyer may venture to express an opinion at this stage. Repeatedly, it has been suggested that the democratic process requires that there be court review of any administrative refusal to certify a new ingredient. The tentative proposal specifies that court review may be had. Of course, it provides further that the findings of the FDA shall be conclusive if supported by substantial evidence. There is no public hearing of the familiar type, and whatever findings are to be made must rest, not on affirmative proof of toxicity, but upon the administrative conclusion that what has been submitted by the applicant is not enough. This is what a lawyer calls a negative finding.

Surprising as it may seem to you, I would suggest that for all practical purposes—and save in the most extreme case of patently arbitrary refusal to credit scientific work—these proposed court review provisions are probably illusory. Experience has demonstrated that even where economic issues are involved, a reviewing court is extremely loath to second-guess the presumptively expert determination of the FDA. Certainly where questions of potential injury to the public health are concerned, they will seldom do so.

All of these questions involved in the consideration of this proposed addition to the Food, Drug and Cosmetic Act are of manifest importance to the food industry. Few will challenge regulatory measures designed to safeguard the public health. Well thought-out and carefully drafted amendments—articulated with the rest of the Act—will serve that end. Hastily contrived suggestions whose only momentum derives from the end sought, irrespective of the reasonableness of the means provided, may on balance disserve the public interest by impeding progress in the development of better foods. Unwarranted haste or ineptitude in the formulation of a law cannot be remedied by detailed and perhaps unauthorized regulations issued later.

Fortunately, the Delaney Committee has demonstrated a keen awareness of these dangers, an insight into the ramifications of the problem, and a novel willingness to explore every possibility lest, in its own words, "unnecessary obstacles to technological improvement in food production" be created. If this abiding respect for the democratic process is to be honored, it is the duty of each of you alertly to follow the Committee's work and to respond to its invitation to comment on the proposed legislation.

Proposed FDA Amendment

Following is the text of legislation proposed by the Food and Drug Administration, to amend the Federal Food, Drug, and Cosmetic Act, which was presented to the Select House Committee to Investigate the Use of Chemicals in Food Products on November 28:

A BILL

To amend the Federal Food, Drug, and Cosmetic Act, as amended, by providing for the regulation of chemical additives in food.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 201 of the Federal Food, Drug, and Cosmetic Act, as amended (21 U.S.C. 321), is amended by adding the following new paragraph:

"(q) The term 'chemical additive' means any substance (including products resulting from changes in such substance after use) intended to be used

"(1) to preserve or alter any food or any characteristic thereof, or

"(2) in substitution, wholly or partly, for any food or any ingredient thereof, or

"(3) as a pesticide or for other purpose in producing, processing, packing, or holding food if such use is likely to result in contamination of such food, which substance is not generally recognized, among experts qualified by scientific training and experience to evaluate the toxicity of such substances, as having been adequately tested to show that it is not poisonous or deleterious, or if it is poisonous or deleterious and is intended for use where a poisonous or deleterious substance is required in the production of food, that it is not so recognized by such experts as having been adequately tested to show that it is safe for such use."

Sec. 2. Section 301 of such Act, as amended (21 U.S.C. 331), is amended by changing "404 or 505" in subsection (d) to "404, 408, or 505"; and "404, 505, 506, 507, or 704" in subsection (j) to "404, 408, 505, 506, 507, or 704."

Sec. 3. Section 304 of such Act, as amended (21 U.S.C. 334), is amended by changing "404 or 505" in subsections (a) and (d) to "404, 408, or 505."

Sec. 4. Section 402 (a) of such Act, as amended (21 U.S.C. 342 (a)), is amended by changing the period at the end to a semicolon and adding: "or (7) if it bears or contains any chemical additive, unless an application filed pursuant to section 408 (b) is effective with respect to such chemical additive."

Sec. 5. Chapter IV of such Act, as amended (21 U.S.C. 341 and the following), is amended by adding the following new section:

Chemical Additives

"Sec. 408. (a) No person shall introduce or deliver for introduction into interstate commerce any chemical additive as defined in section 201 (q) unless an application filed by such person pursuant to subsection (b) is effective with respect to such chemical additive.

"(b) Any person may file with the Administrator an application with respect to any chemical additive subject to the provisions of subsection (a). Such person shall submit to the Administrator as a part of the application (1) full reports of investigations which have been made to show the toxicity of such chemical additive; (2) a full statement of the composition of such chemical additive; (3) a full description of methods of analysis for the quantitative determination of such chemical additive in or on food, including animal and plant tissues if stored therein; (4) such samples of such chemical additive as the Administrator may require; (5) all directions, recommendations, and suggestions proposed for the use of such chemical additive; and (6) if such chemical additive is proposed for use where a poisonous or deleterious substance is required in the production of food, full reports of investigations which have been made to show the quantities of such chemical additive, if any, remaining in or on such food.

"(c) After an application has become effective with respect to a chemical additive as provided by subsection (d), the applicant may file a supplemental application with respect to such chemical additive setting forth any proposed change as to the directions, recommendations, and suggestions for the use of such chemical additive or as to any other information contained in the effective application.

"(d) Unless the Administrator issues a notice of hearing pursuant to subsection (e) prior to the sixtieth day after the date an application or supplemental application is filed, such application or supplemental application shall become effective on that day for the uses specified therein; but the Administrator by notice to the applicant in writing may make such application or supplemental application effective at an earlier date or may postpone its effective date to such time (not more than one hundred and eighty days after the filing thereof) as the Administrator deems necessary to enable him to study and investigate the application or supplemental application. When a supplemental application becomes effective the changes provided therein from the original application shall thereafter be considered as incorporated in the original application.

"(e) If the Administrator finds, after due notice to the applicant and giving him an opportunity for a hearing, that (1) the investigations, reports of which are required to be submitted to the Administrator pursuant to subsection (b), do not include adequate tests by all methods reasonably applicable to show that such chemical additive is not poisonous or deleterious, or if it is, that it is safe for its intended use; (2) the results of such tests show that such chemical additive is poisonous or deleterious and that it is unsafe for such use or do not show that it is safe for such use; (3) the methods of analysis for the quantitative determination of such chemical additive in or on food, including animal and plant tissues if stored therein, are inaccurate or otherwise inadequate; or (4) upon the basis of the information submitted to him as part of the application, or upon the basis of any other information before him with respect to such chemical, he has insufficient information to determine whether such chemical additive is poisonous or deleterious, or if it is whether it is safe for such use, he shall, prior to the effective date of the application, issue an order refusing to permit the application to become effective.

"(f) The effectiveness of an application with respect to any chemical additive shall, after due notice and opportunity for hearing to the applicant, by order of the Administrator be suspended if the Administrator finds (1) that experience in the use of the chemical additive, tests by new methods, or tests by methods not deemed reasonably applicable when such application became effective show that such chemical additive is unsafe for any use upon the basis of which the application or supplemental application became effective, or (2) that the application contains any untrue statement of a material fact. The order shall state the findings upon which it is based. The applicant shall be privileged at any time thereafter to petition for termination of the suspension and the Administrator shall, immediately after prompt investigation and opportunity for hearing, terminate the suspension unless he finds that adequate measures have not been taken to comply with and maintain the provisions of the application, and by order stating such finding refuses to terminate the suspension.

"(g) An order refusing to permit an application or supplemental application with respect to any chemical additive to become effective, or refusing to terminate suspension of the effectiveness of an application, shall be revoked whenever the Administrator finds that the facts so require.

"(h) An appeal may be taken by an applicant from an order of the Administrator refusing to permit an application or supplemental application to become effective, or refusing to termi-

nate suspension of the effectiveness of an application. Such appeal shall be taken by the filing in the United States Court of Appeals within any circuit wherein such applicant resides or has his principal place of business, within sixty days after the entry of such order, a written petition specifying the grounds on which the order of the Administrator should be set aside. A copy of such petition shall be forthwith served upon the Administrator, or upon any officer designated by him for that purpose, and as soon as practicable thereafter the Administrator shall certify and file in the court a transcript of the record upon which the order complained of was entered or shall notify the court that further administrative proceedings will be held. Upon the filing of such transcript such court shall have exclusive jurisdiction to affirm or set aside such order. No objection to the order of the Administrator shall be considered by the court unless such objection shall have been urged before the Administrator or unless there were reasonable grounds for failure so to do. The finding of the Administrator as to the facts, if supported by substantial evidence, shall be conclusive. If any person shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there

were reasonable grounds for failure to adduce such evidence in the proceeding before the Administrator, the court may order such additional evidence to be taken before the Administrator and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper. The Administrator may modify his findings as to the facts by reason of the additional evidence so taken, and he shall file with the court such modified findings which, if supported by substantial evidence, shall be conclusive, and his recommendation, if any, for the setting aside of the original order. The judgment and decree of the court affirming or setting aside any such order of the Administrator shall be final, subject to review by the Supreme Court of the United States upon certiorari or certification as provided in 28 U.S.C. 1254. The commencement of proceedings under this subsection shall not, unless specifically ordered by the court to the contrary, operate as a stay of the Administrator's order.

"(i) The Administrator shall promulgate regulations exempting from the operation of this section chemical additives intended solely for investigational use by experts qualified by scientific training and experience to investigate the toxicity or usefulness of such chemical additives."

THE ADDED CHEMICAL PROBLEM AS RELATED TO CANNED FOODS

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Introduction

One day last fall, while glancing through a new number of *The Scientific Monthly*, published by that august body, the American Association for the Advancement of Science, I came upon an article entitled "Food Poisoning," by Victor C. Vaughan, Professor of Hygiene in the University of Michigan (1). It proved to be fascinating reading. After describing in some detail poisoning by mussels, fish, meat, milk, and cheese, Prof. Vaughan paid his respects to canned food:

"As has been stated, the increased consumption of preserved foods is accountable for a great proportion of the cases of food poisoning. The preparation of canned foods involves the application of scientific principles, and since this work is done by men wholly ignorant of science it is quite remarkable that harmful effects do not manifest themselves more frequently than they do."

This was followed by a brief description of the canning process, and he then went on to say:

"Nearly all canned jellies sold in this country are made from apples. The apples are boiled with a preparation sold under the trade name 'tartarine.' This consists of either dilute hydrochloric or sulfuric acid. . . . The jelly thus formed by the action of the dilute acid upon the apple is converted into quince, pear, pineapple, or any other fruit that the manufacturer may choose by the addition of artificial flavoring. There is no reason for believing that the jellies thus prepared are harmful to health.

"Canned fruits occasionally contain salicylic acid in some form. There has been considerable discussion among sanitarians as to whether or not the use of this preservative is admissible. Serious poisoning with canned fruits is very rare."

However, the author was not so complacent about canned meats, for he said:

"One of the most important sanitary questions with which we are concerned today is that pertaining to the subject of canned meats. It is undoubtedly true that unscrupulous manufacturers are putting upon the market articles of this kind which no decent man knowingly would eat, and which are undoubtedly harmful to all. . . . When the flesh of diseased

animals and substances which have undergone putrefactive decomposition can be doctored up and preserved by the addition of such agents as formaldehyde, it is time that the public should demand some restrictive measures."

This is pretty strong stuff, and it is therefore a relief to know that it was reprinted from *The Popular Science Monthly* for 1899. Indeed, it was typical of the more restrained literature on food of that day.

It was time, Prof. Vaughan said, that the public should demand some restrictive measures. Well, the public did demand and get some restrictive measures. Both the Federal Meat Inspection Act and the Federal Foods and Drug Act became effective in 1906, the latter to be replaced in 1938 by the present Federal Food, Drug, and Cosmetic Act. In the years since 1906 the food industry has expanded enormously and at the same time has steadily raised its standards. Regulatory officials have from time to time paid tribute to the improvements in sanitation, quality, and degree of freedom from sophistication of our food supply.

Chemicals in Foods

That being so, why are we now concerned with the subject of chemicals in foods? Certainly the subject has been getting plenty of attention, both in the scientific and technical literature and in the public press. Professional societies such as the Institute of Food Technologists, American Chemical Society, and the American Public Health Association have established committees to deal with it, and some, such as the American Chemical Society, have held symposia on it. The National Research Council now has a Committee on Food Protection. One phase of the problem was the basis of one of these Canning Problems Conferences not long ago. And finally a Select Committee of the House of Representatives headed by Congressman Delaney of New York has been holding hearings to investigate the use of chemicals in food products. Such an investigation, of course, always carries an implication that legislation will be recommended to deal with any evils that may appear to exist.

For a compact answer to our question about the present interest in chemicals, the interim report of the Select Committee (2) may be read with profit. It says in part:

"II. NATURE AND SCOPE OF THE PROBLEM

"The number of chemicals entering the food supply of the Nation has increased tremendously in the last decade. The rapidity with which substances heretofore foreign to the body are being introduced in the production, processing, storage, packaging, and distribution of food is alarming.

Eminent pharmacologists, toxicologists, physiologists and nutritionists expressed the fear that many of the chemicals being added to food today have not been tested sufficiently to establish their nontoxicity and suitability for use in food. These scientists are not so much concerned with the acutely toxic compounds whose harmfulness can readily be detected as they are with the small and insidious toxic effects of substances which may produce harmful effects only after being fed for months or years.

"Chemicals used in food which present a potential public health problem can be classified as follows:

"1. Pesticides, including insecticides, fungicides, acaricides, herbicides, and plant-growth regulators.

"2. Chemicals used as preservatives, antioxidants, mold inhibitors, emulsifying and other agents added to food during processing or storage.

"3. Chemicals used to wash utensils in food production, processing, and wrapping.

"4. Wax coatings, resins, plasticizers, and other ingredients of food-packaging materials.

"A witness for the Food and Drug Administration testified that over 800 chemicals are used, have been used, or have been suggested for use in foods. Of this total, it has been estimated that 704 are in use today, and that of the 704 chemicals only 428 are definitely known to be safe as used. Thus, there are approximately 276 chemicals being used in food today, the safety of which has not been established to the satisfaction of the Food and Drug Administration and many other groups concerned with the health and safety of the public.

"In addition to the public hazard resulting from the use of toxic chemicals in foods, there are indications that some chemicals are being used in food which may impair the nutritive properties of the food or are added to foods as substitutes for nutritious ingredients. The select committee has only had time to investigate one aspect of the latter problem, the use of chemical emulsifiers to replace natural fats in food items. This will be discussed in another section of the report."

Delaney Committee

The Delaney Committee or Select Committee to Investigate the Use of Chemicals in Food Products was authorized under House Resolution 323 (81st Congress, 1st session) to cover pretty much the same subject matter as that of our conference this morning, namely chemicals in foods, pesticides and insecticides, and fertilizers. In its hearings from September 14 to December 15, 1950, some 72 witnesses were heard, and in addition many letters, statements, memoranda, etc., were put into the record. The various witnesses were asked for

their attitude toward new legislation which would place controls on the introduction of chemicals in food production or processing and require advance proof of their safety to public health before they could be used.

Some of the witnesses undertook to define "chemicals" for the purpose of the Committee's investigation. Apparently the word can be defined in a variety of ways, but in the context of the investigation it became evident that the most important attribute of a chemical is the amount of information available as to its toxicity or safety in the amounts and circumstances in which it would be used. Thus some substances, such as common salt, although "chemicals," are clearly innocuous; others may be so toxic that their use is out of the question. Some, although toxic in large amounts, may be safe under the conditions and in the amounts in which they would be used, while for others the evidence of safety may be insufficient or lacking. In the hearings there was a good deal of testimony as to the nature and extent of testing which would be required to establish the safety for use of a proposed substance.

Canned Foods

What has all this to do with canned foods? That is the question that Dr. E. J. Cameron, Director of the N.C.A. Washington Research Laboratory, undertook to answer when he appeared before the Delaney Committee on December 1, 1950 to give testimony and file a prepared statement (3).

He had in mind, of course, that the Committee's interest was in estimating the need for additional legislation, specifically an amendment to the Federal Food, Drug, and Cosmetic Act to require advance screening of chemicals. Much of his statement was therefore devoted to a review of the ingredients in the various classes of canned foods and their status under existing laws and standards. In this way the area of interest was considerably narrowed. For example, it was pointed out that:

(1) In the case of canned foods covered by standards of identity, including the great bulk of fruits and vegetables, the permissible ingredients have already been screened in the standardization procedure. Any additional ingredients for these products would have to win approval by the same means.

(2) Many other canned foods, although not yet standardized, are of such a simple nature that the question of chemical ingredients (that is to say, deliberately added ingredients) does not arise except in the most speculative sense.

(3) Canned meats, an important class of canned foods, are under rigid control of composition and labeling by the Bureau of Animal Industry

which enforces the Meat Inspection Act. All ingredients must be approved by that Bureau, which always considers their safety to health before granting approval.

There is no need to repeat here all the references to individual ingredients, most of which are recognized in the various standards of identity, and are familiar to everyone who is at all conversant with canning technology. They are clearly not the type of "chemical" about which concern was expressed by so many of the witnesses who appeared, and they were described in Dr. Cameron's statement only for the purpose of giving a fair, balanced picture of the situation with respect to canned foods.

He did, however, point to two aspects of the "added chemical" problem as being of concern to the canning industry, one of them already well developed and the other more or less hypothetical. The first was that of pesticides, regarding which there is, of course, a great deal of other testimony in the Committee's record. To quote the statement:

"Pesticides"

"The problem of pesticides, particularly certain new synthetic insecticides, is one that affects all agricultural products for food use regardless of the form in which they may be marketed. Fresh, frozen, and canned fruits and vegetables are affected in varying degrees. From a public health standpoint the presence of such residues would be expected to offer greatest hazard in the marketing of fresh fruits and vegetables where the consumer may eat the product with little or no attempt being made to cleanse it. Where the food is processed, preparatory treatment may satisfactorily remove certain residues, such as the arsenicals, but only partially remove others, such as the organic insecticides benzene hexachloride and DDT.

"The unavoidable presence of pesticide residues is regarded as the most important facet of the 'added chemical problem' as it pertains to canned foods. At great cost, residue removal studies have been in progress in the industry for several years and are being continued. Yet no properly informed person would claim complete removal of the residues of all pesticides that are now in use. The consumer and the food industry alike would benefit from knowledge concerning the toxicological properties of pesticides and their residues before they are used for food crops.

"It is expected that the findings of the recent Food and Drug hearing on pesticides will clarify thinking on this subject and provide technological guidance for food processors. But such regulations as may be announced will apply only to those pesticides that were considered at the hearing and, presumably, will be subject to change

where new toxicological evidence may become available.

"The great number of pesticides in present use results largely from research developments of the past few years. If we take this experience as a guide we may expect that in the next few years manufacturers will produce many more such chemicals, particularly in the chlorinated hydrocarbon and organic phosphate groups. Under existing procedure these additions to the pesticide list would probably cause another pesticide hearing to be called within a few years. I am convinced that those who expended time and money to the extent required by the recent hearing would not look complacently to a repetition a few years hence. Nor would they care to face another period of doubt concerning official attitude on new pesticides pending such a hearing.

"If new legislation of the kind under consideration could be applied effectively to an advance screening that would lead to approval of particular pesticides, food processors would be relieved of certain very definite worries incident to the unregulated use of such compounds. The availability of specific information regarding permitted use and tolerances would make possible intelligent adjustment of horticultural and processing practices to meet the public health objectives.

"It is recognized that the pretesting of pesticides on the large scale that is indicated by the recent developments in this area would be time consuming and expensive. Nevertheless, adoption of a new pesticide should be predicated on reasonable evidence that its use does not create a health hazard. Otherwise the advance in horticultural practice that is promised by use of the pesticides may be in conflict with public health considerations."

As to antibiotics, Dr. Cameron reviewed the developments which had aroused interest in the proposed use of subtilin in conjunction with mild heat as a means of preservation of canned foods. Research investigations during the past year have greatly dimmed the prospect for any early application of this principle, but there remains the possibility that some such application will eventually develop. If that should occur, a number of problems would immediately call for solution. It would have to be determined, for instance, whether the antibiotic is toxic, whether it interferes with beneficial intestinal bacteria, and whether it creates resistant strains of pathogenic bacteria, obviously undesirable if the same antibiotic were used therapeutically. Also, there would be the obstacle of existing food standards limiting optional ingredients. Use in canned meats would be at the discretion of the Bureau of Animal Industry, but subject to proof of safety to health. And finally, there is no apparent application to fruits, since the supplemental

heat treatment would be in itself sufficient for preservation.

This leaves for consideration the low-acid nonseasonal and vegetable specialties, and seafoods. Some of these may not be reached for several years in the standardization program, and in the meantime, it is not clear what controls would be available should some commercial application of antibiotics in food processing be considered.

Conclusion

In the Delaney Committee's interim report referred to above, it is stated that "the evidence so far presented indicates that existing Federal laws dealing with the use of chemicals in food are not adequate to protect the public against the addition of unsafe chemicals." It also points out that many of the witnesses had advocated an amendment to the Federal Food, Drug, and Cosmetic Act generally similar to the "new drug" section of that Act, whereby proponents of a chemical additive would be required to furnish satisfactory evidence of its safety. To give all affected parties an opportunity to be heard, it was recommended that the investigation be continued, and the House of Representatives recently approved this recommendation by passing House Resolution 74 reconstituting the select committee.

This brings us up to the present time. Peering closely at the crystal ball, we can see a strong suggestion that some sort of amendment to the Food, Drug, and Cosmetic Act will be recommended to Congress. Should this be enacted in anything like the form that has been suggested, it will impose on somebody the responsibility for determining whether a substance to be used in production of food or added as an ingredient is really safe from the consumer's standpoint. That this is no mean task is clear from the testimony of various toxicologists and pharmacologists, who have estimated anywhere from two to 10 years for a set of acute and chronic toxicity tests.

I think most of us in the food industry recognize that whether or not this responsibility is fixed by law, it exists in fact. However, there may well be room for divergent opinions as to who should undertake the job.

Before closing, let me refer again to the article by Prof. Vaughan which was mentioned at the beginning. Having in mind that this was written 52 years ago, we are tempted to think only of the progress that has been made in that time. Yet if we arranged Prof. Vaughan's comments and the report of the Delaney Committee in parallel columns, we might see certain faint similarities in spite of the lapse of 52 years. One is tempted to speculate as to whether the Delaney Committee report, if read in the year 2003, will look as strange

as Prof. Vaughan's remarks do now.

The canning industry has a stake in this matter of chemicals, particularly with regard to pesticides, and, as the proposed use of antibiotics demonstrates, with regard to possible developments in the future. As matters stand now, there seems to be no cause for embarrassment about the materials used as ingredients in canned foods; most of them have met formal approval, and we believe all of them have a clean bill of health on the basis of existing knowledge. At the same time we should all benefit

from a clearer fixing of responsibility for determining the safety of materials used in producing our foods.

References

- (1) Victor C. Vaughan, "Food Poisoning," *Scientific Monthly*, Vol. 71, No. 3, 155-161 (1950); reprinted from *The Popular Science Monthly*, Vol. 55, 47-59 (1909).
- (2) H. Rept. 3254, 81st Congress, 2d Session, "Investigation of the Use of Chemicals in Food Products," January 3, 1931.
- (3) Hearings before the House Select Committee to Investigate the Use of Chemicals in Food Products, 81st Congress, 2d Session, created pursuant to H. Res. 325, pp. 489-501 (1931).

PROBLEMS IN A PEST CONTROL PROGRAM FOR THE CANNING INDUSTRY

By Charles E. Palm, New York State College of Agriculture, Cornell University

Pest control is a recognized phase of almost any modern agricultural production program; its importance has long been recognized by the producers and processors of our food and fiber. Within the past decade it has become increasingly important for the canning industry because the control of insect pests is a specialized job requiring the training and experience of a wide group of cooperating specialists. Our rapid advances in the technology of pest control have brought not only an array of the most effective pesticides in our history, but with them new problems, including safety precautions to the users of these materials, possible off-flavors that some insecticides may cause in treated commodities, chemical residues remaining on the crops at harvest, new methods of application, the development of resistance to insecticides by certain insects and mites as well as other interrelated problems. It is for these reasons, if for no others, that we might well pause for a few moments to examine some of the current problems of applied entomology here at the mid-century mark.

May it be assumed for purposes of discussion that we consider insect control in relation to the canning industry as being divided into two parts: (1) those insect pests that attack the growing crops and cause direct losses, or render the commodities unfit for processing due to contamination of insect fragments, and (2) insects that may cause trouble in the processing plants and result in accidental contamination of the food products during processing. Since this latter group constitutes a phase of plant sanitation and is not a direct responsibility of the producers of the raw products, I would prefer to recognize it as being an important problem but devote my remarks more to those pests that are present in the growing areas.

I am quite sure that the men who first used Paris green some 80 years ago for control of the Colorado potato

beetle little realized what an important era they were initiating in insect control. It has been through the use of chemicals formulated as insecticides that many of the consistently high yields of commodities have been made possible. We realize that pest control is only one phase of production, but in many instances it may be a limiting factor. No matter how well the ground is fitted, how good the seed, how complete the fertilizer, if insects and plant diseases are not controlled, many crops cannot be produced profitably or fit to be marketed. With the all-out demands for maximum production during the last war, many American farmers realized for the first time the extent to which insecticides were of value to them. Now we seem to be in a period of what has been described as prolonged tension, when once again production is being called for and with labor as one of the scarcest commodities, the farmer must adjust his schedules to make the most of his time and effort. We may face shortages in supply of some pesticides which will cause careful consideration of alternate materials that must fit into control programs. Those of us in the Extension Service and Agricultural Experiment Stations feel that we have an obligation as well as a privilege of working closely with the farmer and those for whom he produces, to make the most of our recent advances in the field of pest control.

If I may draw on experiences close to home for a moment, I would like to describe a part of our New York program with the canning industry. The College and Experiment Station staffs have been fortunate in having a long period of close working relationships with the food processing industry in the state as well as experience with the growers who produce the raw products. It has been our established policy to conduct much of our research on the farms of individual growers where problems exist and to solve them as best we can with their cooperation. Some three years ago the Association of New York State Canners asked the administration of the New York State College of Agri-

culture at Cornell University if we would undertake a two weeks' training school for selected field men from various member organizations of the New York State Canners. We considered it a real privilege to meet with these practical field men daily for the two weeks' period and to try, to the best of our ability, to explain something of the basic problems of entomology, plant pathology, agricultural economics, plant breeding, and vegetable crops production. In entomology it was the first opportunity that some of these men had ever had to look at an insect through the microscope, to learn how they breathe, feed, and reproduce. After the basic work, we went into specific problems with pests of canning crops in which they were interested, for example, pea weevil, pea aphid, cherry maggot, corn earworm and the like. We had an opportunity to discuss the pros and cons of the newer insecticides, the residue picture, safety precautions on use, off-flavors, and so on. Movies gave us a chance to bring out the principles of some of the newer application equipment. This course ran over three years with a two-week period each year. Obviously, we benefited greatly from exchanging ideas with these men from the industry and gained a better appreciation of their point of view. I feel that they too left with a broader concept of some of the problems of pest control which will benefit them in their day-to-day contacts with farmers during the growing season.

We are living in an age where perfection is the goal. We like to do things as quickly as possible. The consuming public wants produce that is of top quality and free from pests or pest injuries. From the viewpoint of the canning industry, attaining this goal is a joint responsibility of its own field staffs, the farmers, the Extension Service and research staffs of government and industry. It is industry that supplies the insecticides and application equipment, the research workers of all groups who evaluate them, and in turn the Extension Service and technical service men of these agencies that bring home to the grower the recommendations on use within a given area. Last, but not least, it is the grower himself who must either apply these control measures or employ someone to do it for him.

Since 1939, the Departments of Entomology, Plant Pathology and more recently Agricultural Engineering of the Geneva and Ithaca Stations of Cornell University have held an annual conference about mid-November each year for the purpose of presenting to the agricultural pesticide and application equipment industries interested in New York agriculture, the highlights of our research of the current season and our pesticide recommendations for the coming year. The conference gives the industry an opportunity to know how their materials

performed in our experiments and also early notice of our recommendations in event they plan to supply materials to growers in the state. It is another phase of the cooperative program which is becoming increasingly important in the complicated picture of pest control.

There is need for a better understanding on the part of some growers of the necessity for producing crops free from insect infestation where these crops are to be sold for processing. Last fall I watched a freezer plant reject Brussels sprouts and broccoli based on the analysis of the samples for contamination by cabbage aphids. Needless to say, it was not a pleasant experience for either the producer or the processor. Both wanted to do business. The loads of sprouts and broccoli that were rejected reduced the pack of the processor and did not make the farmer feel good either. One grower remarked that no one ever heard of sprouts being grown without a few lice and hereafter he would sell to the fresh market. The processor felt that he should not be held to certain purity standards when the fresh market accepted produce below those standards. The solution to the problem is one of better understanding and planning. Growers will have to learn that their produce for the processor must meet certain standards regarding freedom from insect contamination. In order to meet them, a control program will have to be planned and carried through from the time the plants are set in the field until harvest, treating for bugs even before bugs exist. If they wait until aphids show up before they start to treat, it may be too late. The insecticides they will use need to be chosen with relation to possible residues at harvest. Their sprayers have to be adapted to hit the under side and lower parts as well as the tops of the plants. They must have a schedule for application worked out in advance. With joint effort between the grower, canners' field men and the Extension Service, a problem of this type can be solved satisfactorily for all concerned.

There are certain basic considerations relating to pest control that the processor must consider. He needs a top quality product free from injury, residue and pest contamination in order to maintain purity standards. In New York we have two types of responsibility for insect control, one in which the canner assumes primary responsibility for organizing, timing and applying the insecticide program. This is illustrated by the control program for the pea weevil where the canners employ field entomologists to determine the infestation and direct the plane applications for its control. A similar situation exists with the pea aphid. The other and more general type of responsibility rests with the individual grower, and is well illustrated by the control of the cherry fruit flies on cherries grown for proc-

essing. One should add the custom operator who will apply insecticides for either the canner or the grower and you have a field of operations that is expanding rapidly in some areas. In Florida and California, grower cooperatives also provide their own pest control services for their members. This type of operation seems to be particularly effective in the control of citrus pests.

One of the responsibilities of the Experiment Station and Extension Service is the preparation of recommendations for insect control to suit the major needs within the state. The farmer is not organized on a corporation basis, and through the years he has helped build up his state colleges and experiment stations to work as a public agency to evaluate his problems impartially. Speaking as a member of one of these stations, I can truthfully say that we feel a responsibility to all growers and processors, and in fact, we desire to be of help to anyone who has an insect problem. There are certain uses of some of the newer insecticides on produce grown for the fresh market which may not be in accord with the thinking of the processor. To be specific, a material like BHC may fit as an alternate recommendation into the delayed dormant schedule for the control of rosy aphid on apples, before the fruit is even in the blossom stage. The processor may object to the purchase of apples from trees treated at any time with BHC with the thought that sooner or later some off-flavor may develop. I feel that the Extension Service has a perfect right to include BHC in its recommendations for those who may need it, but at the same time it has the responsibility to point out to all growers who plan to sell their crops to processors that BHC should not be used in their schedules. To accomplish this type of program a close liaison must be maintained between the processors, the research and extension workers, to make known the restrictions that may be placed on a given material because of off-flavor, lack of suitable analytical methods for determining residues or other logical reasons. We in the stations have had wonderful cooperation thus far and hope that as the food processing industry develops new methods for insecticide residue determinations, we may be kept informed since they may have a bearing on future recommendations.

Another type of research program that exists to some extent between the canners and the state and federal stations is the probing of possible problems that might cause trouble in the future. We have been glad to cooperate with the National Canners Association in treatment of experimental blocks of various crops with different insecticides. When harvested, these were carried through commercial processing procedures and then put to various tests for flavor, etc. Similar cooperation has been used to

investigate the possibilities of pest contamination. Many of our experiment stations have pest control programs in cooperation with the Divisions of Food Processing and Home Economics, where cooking tests and taste panels are an integral part of the pest control research. This is particularly true of insecticides used in the soil for the control of wireworms, grubs and other pests. In New York we have trouble with our native white grubs in strawberries. In an effort to improve on the recommended control with lead arsenate treatment at setting time, a number of organic insecticides are being tried. The program expands beyond the determination of insecticidal efficiency of a given material. Each material has to be checked for possible effect on the flavor of the fresh berries and the flavor of the canned and preserved fruit six months after processing. Probably chemical residue determinations will be made on the berries to see if there is absorption of any of the materials. After this program is carried through with strawberries, then consideration must be given to other canning crops that may be grown in the rotation on land that may be treated. In the area of which I speak, green beans and tomatoes fit into the rotation. This example may serve to illustrate what is happening in many areas in trying to anticipate trouble with pest control recommendations and be in a position to avoid it.

Application of insecticides poses a problem which is of growing importance, namely safety to the operator and avoidance of insecticide drift to areas beyond the boundaries of treatment. The responsibility for this safety program in the use of insecticides may be on the canner if he is conducting the program. Pollination of many crops is largely dependent upon insects. The honey bee is the species most widely used to insure adequate aid in the set of fruit, beans and other crops needing pollinators. A number of regions of the country have already had trouble from bee poisoning due to the drift of toxic materials into areas where bees were working. In New York after a joint conference with beekeepers and fruit growers, the Extension Service eliminated lead arsenate in the pre-blossom spray schedule for apples and thus corrected one of the most serious sources of bee poisoning. Now we are concerned with summer applications of several of the newer organic insecticides since much of our farming is cut up into small acreages of diversified crops and drift can easily go over into pasture or forage crops. Lawsuits are bound to arise from growers who do not wish to have their pastures or other crops "treated" accidentally by drift from their neighbors' application. Dust formulations applied by aircraft can pose a problem along this line. I feel that insecticide drift is one of our growing

problems that is a long way from being solved and it deserves careful, constructive attention from the extension service, the canner, the custom operator and the farmer who may be applying the materials.

There have been several deaths and near deaths in recent years from the use, or perhaps I should say, misuse, of a few of the more toxic of the newer insecticides. Industry has taken a definite and commendable step in labeling, cautioning, in fact asking that unless proper precautions for safety can be observed in applying a given material that it be returned; yet there is still a tendency on the part of those applying insecticides to depend too much on their own experience and be satisfied if they are lucky—to feel that the use hazards are overstressed. It gives one the creeps to see a plane crew handling a phosphate insecticide without respirators and see the pilot's exposed face covered with a dusty layer of the insecticide as he wipes off his goggles while the crew loads the hopper for the next trip. The program for safe use is as important today as ever, perhaps more so, since there appears to be a growing carelessness in handling some materials as people escape injury. We have had the story thrown back that "you said that about DDT at first, but nobody got hurt with it either." Where it is possible to demand safety precautions, they should be demanded. We must continue with an educational program and urge safe use of toxic chemicals.

Growers in producing crops for processing are naturally interested, as is the processor, in quantity and quality of the crop. Both want to do a good job and make a little money if possible, and there isn't anything wrong in that either. There are definite plans in a growers' schedule for production of a crop for processing that may differ from those that might be used if the crop were going to another market. These cut across the board in fertilizer practices, varieties, time and method of harvest, selection of pest control methods, and so forth. Perhaps the degree of finish on fruit, for example, does not have to be as high as for fresh market competition. It is my understanding from visiting in citrus areas in Florida that this is true with oranges and grapefruit and certainly it is true for apples in our own area. We still recommend lead arsenate for cherry fruit fly control on cherries for processing because growers can apply it with confidence of control and processors know that they can remove any residues before processing the fruit. I see no reason to change from older, established methods of pest control unless there is a definite and particular reason, nor is there need for paying for extra finish when it does not in any way improve the quality or quantity of the product for processing. It is interesting to note that for a three-year average, 1946-1948, in New York, the following

percentages of our fruit crops went to the processing market: apples, 48 percent; pears, 0.4 percent; sour cherries, 88 percent; sweet cherries, 80 percent; grapes, 90 percent; peaches, 0.0 percent. We have kept these facts in mind in developing spray programs for pest control.

The matter of fragments as they affect purity standards is a problem that is important. Contamination can occur from infestations during productions of the raw products or during the time of processing. The entomologist is working with the producer to minimize his cause for trouble and with the processor to prevent infestations around the processing plants. It is, and always will be an ever present problem since insects are as much a part of this world as man himself. Because of the necessity for purity standards of the highest type, all ways to reduce possible sources of contamination must be under continuous scrutiny along the production and processing lines of operation.

We have heard about chemical residues on crops at harvest and their possible toxic effect to man and other animals consuming them. National attention was given to residues of arsenic, lead and fluorine on apples in the late twenties and up to the present. With the tremendous development of new pesticides during the past ten years, residues have become a prime question. The entomologist is interested in killing insects but fully recognizes his responsibility for making pest control recommendations that are in the interest of the public health. After all, he too is a consumer and expects high purity standards in the food he buys for his family. Without reviewing the events of the past twelve months, may we recall the hearing held by the Food and Drug Administration in Washington as a part of its responsibility under the Food, Drug and Cosmetic Act, to accept evidence on the need for use of pesticides on fresh fruit and vegetables, materials used, dosages recommended, residues at harvest and other pertinent information. Everyone who had something to contribute to this hearing had the opportunity to do so. The most complete set of data available anywhere in the world on this problem are now compiled and are being studied. Further, I think everyone welcomed the thoroughness of the job and became better acquainted with the many angles to it. Entomologists must rely upon the toxicologists, pharmacologists, and other specialists to determine safe levels for intake of a given chemical. Not only is there the acute, but probably more important to consider, the chronic toxicity of small amounts of a chemical taken frequently. Fortunately the chemists, entomologists and plant pathologists have anticipated the need and possess data pertaining to residues on various crops that have been treated with pesticides, in many parts of the country.

In our own case, we have much data for guidance when tolerances are announced by the Food and Drug Administration, as to what application schedules will be permissible to meet these tolerances under New York conditions. Similar data in other areas will be of like value to their growers. We have learned much about uniform sampling techniques, analytical methods that give reliable results and further, the rate of residue loss from growing crops that can be attributed to growth, weathering and a combination of these factors. In lettuce, for instance, rapid plant growth shortly before maturity is responsible for substantial residue loss as determined on a weight basis of the harvested crop.

Many of us have been following the investigations of the Select Committee to Investigate the Use of Chemicals in Food Products established by the 81st Congress under the chairmanship of Representative James J. Delaney. Testimony has been received from 74 witnesses. In view of the far-reaching consequences of the proposal before the committee that a chemical or synthetic should not be permitted to be used in the production, processing, preparation, or packaging of food products until its safety for such use has been established, and that the food chapter of the Federal Food, Drug, and Cosmetic Act should be amended to include a section generally similar to the "new drug" section of that Act, it was pointed out by the Committee in the report that it was of the opinion that individuals and groups who would be affected by such legislation should be given further opportunity to present their views and to comment on proposed legislation before any specific recommendations are made to the Congress. As the Committee continues its work in the 82nd Congress, it is hoped that testimony will be given by workers from the Experiment Stations and the U. S. Department of Agriculture as well as others who can contribute. It is possible that unwarranted controls over the formulation and use of pesticides could result in poorer control as well as retarding research and development of new materials.

Application equipment is, in many instances, just as important as the insecticides and fungicides in terms of ultimate success or failure of pest control. Fortunately we have an extensive program underway, in all parts of the nation, to develop and appraise new applying equipment. This again is, in the larger sense, a cooperative program with industry, government, and the grower, working together. Last spring and summer I had the pleasure of visiting research laboratories in more than 30 states and parts of Mexico. While at Texas A & M College there was an opportunity to see the new airplane that is being designed and built specifically for agricultural uses. A wide range of interests are participating in this

important project and the thought of a plane especially designed for the application of pesticides, among other uses, is most encouraging. This past fall test flights of the ship took place and I am sure that all of us will watch the developments of the spring and summer as it goes through additional experimentation. This program may well mark an expanding era in the application of pesticides from the air.

At Cornell, the Department of Agricultural Engineering has undertaken a research program on application equipment in cooperation with Entomology and Plant Pathology. Certain basic information regarding equipment for the application of concentrates is evolving that is of value in guiding growers now and in the future. A cooperative study is also underway in our station among the agricultural economists, pomologists, plant pathologists, agricultural engineers and entomologists, to study the cost of pest control on apples. Two years of work have gone into this project covering over a hundred farm operations with various sorts of sprayers and dusters. The data show that good growers are able to attain excellent control of pests with all types of equipment now in use, and as would be expected, poor control has been recorded for all types of equipment in the hands of some individuals. Based on cost account records, pesticides represented the greatest share of the total cost of control, with machinery second, and labor third.

The development of resistance to insecticides by some insects and mites is a matter of practical concern. Probably the housefly has received the most attention along this line, but it is only one of several species showing definite resistance to some materials. Recommendations are being revised to meet this challenge. Of a similar practical nature is the creation of major pests, through the use of insecticides, where minor pests occurred before. Take, for example, the red-banded leaf roller and various mites on fruit. Prior to the use of DDT for codling moth control, we did not have the difficulty with these pests that we have today. Additional applications of specific materials are required for their control which of course add to production costs. As the search continues for new pesticidal chemicals, we find definite lines of thought evolving and experimentation following. Such is the case with the systemic insecticides. These chemicals are absorbed by the plant and kill certain species of insects or mites that feed on them. As the layman says, "It's a case where the plant bites the bug." Naturally the canning industry will watch this development closely and with concern. It is only in experimental stages on food crops in this country, but has been used commercially for pest control in some other areas of the world.

In conclusion may I attempt to bring together a few of the thoughts that I

have tried to point out during the discussion:

1. Pest control is recognized as an important phase in the production of raw materials for the food processing industry. A variety of insecticides and fungicides are required to do the job, and fortunately, we have an array of the most effective pesticides in all of our history.

2. The use of these pesticidal chemicals poses a number of problems, namely (a) effectiveness in pest control, (b) consideration of possible off-flavor reactions and residues on the commodities treated, (c) safe use to the operator, and (d) confinement of toxic materials to areas of treatment.

3. Purity standards of processed commodities are tied in with effective pest control.

4. New applying equipment is making possible more effective pest control programs. No matter how good an insecticide may be, it has to be applied properly to be effective.

5. An interpretation of the data furnished the Food and Drug Administration is underway and will form a basis for any residue tolerances that may be set for pesticides used on fresh fruits and vegetables.

6. The Congressional investigation of the use of chemicals in food products has a direct bearing on the pest control field. The protection of the public health is a basic concept to which each of us subscribes. It is recognized by growers and processors that food production requires pest control to insure quality and quantity of essential raw products.

7. If there is an underlying theme in my remarks, it is a plea for continued and expanded cooperation. Better understanding of each others' problems is essential to progress. As long as the farmer, the scientist, the processor, and the manufacturing industries join hands, the consumers of the nation will be assured of an adequate supply of food products of the highest quality.

FERTILIZERS IN RELATION TO FOOD COMPOSITION

By Russell Coleman, President,
The National Fertilizer Association

When America was first settled, this country probably had the richest resources of any nation in the world. Yet with all of its resources at that time, it was providing sustenance for only about 800,000 Indians, and even then there was continual warring among the various tribes for the better hunting grounds. Since that time we Americans have learned that there are good hunting grounds all over this great country of ours. The good hunting is to be had, however, only by those who make good use of their scientific know-how and our natural resources. Within the last hundred years, as a result of our American ingenuity, remarkable progress has been made in agriculture as well as in industry. With the usage of chemical fertilizers, better farm machinery, insecticides and other scientific advancements we have reduced the amount of labor required to feed and clothe America from 60 percent of our labor force in 1850 to about 12 percent of our labor force today.

The development and proper use of chemical fertilizers represent progress. Throughout history, there always has been a group opposing progress. For example, there have been those who said that the automobile could never replace the horse and buggy; and later those who cried that airplane travel would never become a reality.

Despite the established fact that fertilizers are essential to our public interest, a small but vocal cult has arisen and raised its voice against the findings of the best agricultural stu-

dents. This cult's pseudo scientific pronouncements, filled with fancy instead of fact, with myth instead of merit, have attacked the use of chemical fertilizers as dangerous to human health. Although only a small minority of our urban population has given any attention to such befuddled statements, the teachings of the organic farming cult have been spread throughout our nation. In order to determine whether there might be any truth to these unfounded claims, a special investigating committee from our national Congress recently held hearings to determine the facts. Outstanding scientists from all sections of our country, as well as representatives of the organic gardeners, were asked to testify, and the presentation of this paper consists largely of the results of this testimony.

Critics of the fertilizer industry have tried to implant in the public mind the idea that a chemical product is the result of some sort of black magic, and as such undesirable. A so-called "natural" product, according to this mythology, is just the opposite and embodies all the worthwhile virtues. If this line of reasoning were carried to its logical conclusion we should all shun the use of such chemicals as aspirin, novocain and the sulfa drugs and rely for medical treatment only on such products as roots and herbs as did the old witch doctors in days of old. As everyone knows, modern medicine does not overlook the curative possibilities of roots and herbs. In fact, many a chemical medicine is but the synthetically produced equivalent of the active principle of some medicinal herb, or even the refined and concentrated active principle extracted from

the herb itself. The commercial fertilizer industry in like manner recognizes that organic materials have an important place in our agriculture. But trying to convince the organicist that chemical fertilizers are valuable to agriculture is like attempting to show the witch doctor the merits of modern pharmaceuticals.

Totally ignored by these critics is the fact that commercial fertilizers are basically and fundamentally products of nature which are processed by man to make more readily available their essential plant nutrients.

Actually the forms in which nutrients are absorbed by plants are the same whether the nutrients are supplied from chemical fertilizers or from organic sources. But chemical fertilizers do the job in a more advantageous way. "Their important contribution," says Richard Bradfield of Cornell University, "is that they have stripped the raw materials of all of the unessential materials and have given us concentrated products, which can be bagged and shipped long distances at lower costs and which can be stored satisfactorily for long periods of time."

It is well known that when nitrogen is added to soils in organic form such as compost, much or most of it is changed by bacteria to nitric acid before plants can use it. Now, there is absolutely no difference between the nitric acid produced by bacteria and that in a chemical fertilizer plant. How then, could the use of one product produce good food and the other inferior food as propounded by the organic farming cult? Also, the phosphorus and sulfur which exist in organic combinations in compost are changed by bacteria to phosphoric and sulfuric acids, before being used by plants. Here, again, these acids are no different from those produced and used in a fertilizer factory. It is well established that the plant nutrients supplied in organic combinations must be first mineralized by bacteria, that is, changed to inorganic acids, bases and salts, such as is their form in most chemical fertilizers, before they can be used by plants.

Dr. A. F. Camp, vice director in charge of the Citrus Experiment Station in Florida, puts it this way: "There is no more likelihood of encountering nitrate of soda or superphosphate as such in the glass of orange juice you had for breakfast just because it was fertilized with these materials, then there is of finding hay in your milk bottles because the cow was fed hay, or slop in your sausage because that is what your pig ate, or grain in your eggs. Plants have been raised in laboratories for many years with purely chemical solutions. Today more people are applying this technique to the commercial production of such crops as tomatoes and cucumbers and no evidence has been published by reputable workers

to indicate that when all of the elements needed by the plant are supplied that the resulting product is any less valuable than the fruit produced by plants growing in the soil. Plants are living organisms which take certain chemical elements from the soil and with the aid of sunlight, water and carbon dioxide elaborate a living tissue just as a steer converts grass to meat."

The Campbell Soup Company has found in actual field tests that the use of chemical plant foods resulted in more and better tomatoes than was the case when only manure was used. This is what Dr. Jackson B. Hester did. He made up a chemical fertilizer by using various sources of inorganic salts which closely approximated the composition of 10 tons of wet cow manure in all elements. In growing Rutgers tomatoes, the results from the chemical mixture were compared with those from 10 tons of cow manure. The experiment was conducted on plots replicated five times. The results: The chemically treated plots outyielded the manured plots by 30 percent and the fruit produced had better color, more total solids, higher ash, sugar and titratable acids than those grown on the manure plots.

And now let me tell you about an experiment in Germany, which, thanks to your own Dr. Mahoney, has been made available to the American public. Vegetables grown under different fertilizer practices were fed to babies, presumably some of the orphans of World War II. The vegetables were grown in one case on land receiving only manure, and in another case on soil that had received both manure and a nitrogen, phosphorus and potassium fertilizer.

During the course of the baby-feeding experiment, a severe attack of chicken-pox attacked both groups at the same time. Analyses showed that the vegetables fertilized with manure plus NPK contributed 29 percent more iron and 38 percent more copper than the products of manure fertilization only. Also, the red blood corpuscle picture of the affected children was better when vegetables with complete fertilization were used for feeding.

One claim made by the organic gardeners is that chemical fertilizers are causing an increase in heart disease and cancer among our people. It is interesting to note that North Carolina, highest fertilizer-consuming state, has the lowest death rate due to heart disease and one of the lowest due to cancer. Likewise, the southeastern states as a group—the region where the most chemical fertilizer is used—has the lowest death toll due to these man-killers of any region in the United States.

The organicists decry that the use of fertilizer is destroying all of our soil organic matter. Actually, the only way to maintain soil organic

matter is through the judicious use of fertilizers. By applying purely inorganic minerals, one can add greatly to its organic matter content. During a 15-year test of 14 cultured crops, five small grains and six hay crops at the West Virginia Agricultural Experiment Station, 5 tons of fertilizer raised the total crop yields from 41,000 to 118,000 pounds per acre, but what's more, it greatly increased the organic matter content of the soils because of the much greater amount of root and stubble than was left in and on the soil after the crops were harvested. The increase in the organic matter in the plow depth of soil amounted to 3,600 pounds for each ton of fertilizer applied. It seems safe to assume, therefore, that one ton of fertilizer, rightly used on land that needs it, can be made to add 2 tons of organic matter to the soil, even when all the crop are harvested and hauled away.

The fertilizer industry for years has been the strongest advocate for conserving organic matter. Numerous bulletins published by our Association have advanced the values of organic matter. However, the amounts of organic matter needed to meet our nation's plant-food needs are just not available. If all of the manure, garbage and other organic waste were saved, we still could not meet more than 10 percent of our plant food needs.

If America fails to use efficiently the commercial fertilizer it has learned to produce, it will be equally as guilty as the proverbial tenant who hid the talent which his lord had given him and so lost it.

Furthermore, without the use of fertilizer, the problems of meeting adequately the food needs of the world's more than 2 billion people is virtually insoluble.

Professor Truog clearly sums up the facts as founded by our research workers in the agricultural experiment stations. This is what Professor Truog says: "Absolutely no evidence exists to the effect that the judicious use of mineral fertilizers is at all injurious to soils, or tends to produce crops which are unsatisfactory as feed for animals or food for man. In fact, evidence, almost without end, now exists showing clearly that the use of mineral fertilizers on depleted soils promotes the growth of crops which have superior nutritive values."

And this is the statement of the Select Committee of the House of Representatives which recently studied the effect of the use of chemicals in the production of food. "No reliable evidence was presented that the use of chemical fertilizers has had a harmful or deleterious effect on the health of man or animal."

Thus the arguments of the faddists that chemical fertilizers poison the soil, plants and animals stand exposed in all their false dress.

FISHERY PRODUCTS CONFERENCE

PRICE STABILIZATION AND ITS RELATION TO FISHERY PRODUCTS

By Wayne E. Rice, Consultant,
Office of Price Stabilization,
Economic Stabilization Agency

To many of you a discussion of price controls will not be new. Few of us had any idea during those last days in 1946 that in four short years the great industries of this country would again be operating under a controlled pricing system.

Even in early September when the Congress passed the Defense Production Act of 1950, it was the hope of many that mandatory controls could be avoided. It was clearly the intent of the Congress that an attempt was to be made to hold prices in line through a program of voluntary controls before mandatory controls were to be imposed.

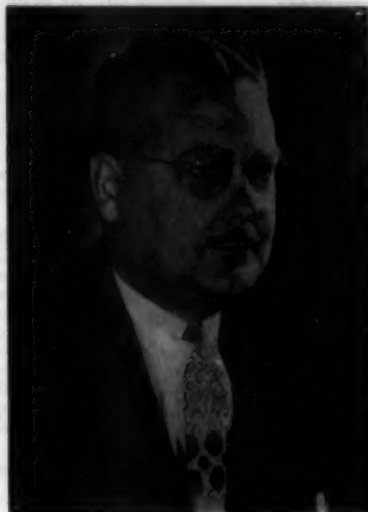
Such a program was given to industry in early December and each of you is familiar with the results. The forces of inflation had gained too much momentum. The accelerated rate of price increases could not be stopped by voluntary means. Sellers could not keep pace with mounting costs. The situation was not helped by the constant newspaper reports that mandatory controls were imminent and were due tomorrow, this weekend, or next Monday.

It soon became evident that the government must undertake a general freeze of prices even though in many respects the Agency was not yet staffed to efficiently handle such a program. Many business men, members of Congress, and the general public were clamoring for action. To the Director of Price Stabilization goes the credit for having the courage to put a brake on rising prices even in the face of the difficulties to be encountered. In mid-January a deadline date was set for a freeze order.

In a few short days—days without enough hours—much discussion, drafts, redrafts, agreements, disagreements, policy discussions, and a host of other considerations, the General Ceiling Price Regulation was issued on January 26, 1951. Many sellers who had held prices steady found themselves in a squeeze and in a new and unfavorable relationship with their competition. This was to be expected as we all knew.

It is our job to take the actions that are necessary to relieve the out-of-balance ceiling price relationships that are unavoidable in a general freeze and to do this as rapidly as our limited staff will permit. Indus-

try and government have a fund of valuable experience gained through those days in the middle 1940's which can be put to effective use. With the help and cooperation of industry we can move at a much faster rate to initiate workable regulations which will avoid the mistakes of the trial and error period of OPA. This is the big advantage over the situation in 1942.



WAYNE E. RICE

That doesn't mean we have all of the answers, that you can come to Washington tomorrow and expect to get your problems taken care of. It does mean that you and others in the food industry can use all of the information and data on your business operations to help us develop the kind of regulations that will do a good price stabilization job and will at the same time be a fair and equitable pricing program for your industry. Believe me, we welcome your ideas and your help, particularly constructive help.

Let's for just a moment dwell on some of the problems to be considered in taking fish and fishery products out of the General Ceiling Price Regulation and placing them in a regulation of their own, and also some of the problems that must have more immediate attention.

The first major problem is that of fresh fish versus frozen fish. At the present time, fresh fish are exempted by Section 14 of the General Ceiling

Price Regulation, while frozen fish are under control. Many questions arise concerning fresh frozen fish, fish frozen by weather conditions and then defrozen. Some action on our part is necessary to correct this situation.

Then we must give consideration to the position of the canner whose selling prices are controlled by the price freeze but with no control over the prices of fresh fish purchased for canning. The canned salmon pack and the tuna pack require major consideration.

Fortunately, we have three well qualified men to work on these problems. With Alger Pike to head up our fish program, ably assisted by Joe Lamere and Bill Eardley, we expect to make some active progress in the next few weeks, but again we are going to need some real assistance from the industry.

Some of you who sell to the armed forces and the other defense agencies will be interested to know that we are amending the General Ceiling Price Regulation to validate all defense agency contracts awarded during the base period even though no deliveries had been made by January 25. This will also apply to contracts for which bids had been advertised during the base period. The amendment will contain some other provisions aimed at assuring a necessary flow of product to the armed forces. New regulations as they are issued will provide for sales to defense agencies, but some intermittent action is necessary.

At distribution levels we expect to issue margin regulations setting percentage markups by categories of grocery products at both wholesale and retail within a short time, probably about two weeks. These regulations will follow the same pattern as those used by OPA except for minor changes to take care of new conditions and some changes in commodity categories. These regulations worked rather well for OPA and can be put into effect once again while we continue a study of the adequacy of the markups and the other provisions of the orders. This action will take care of our squeezes at distribution levels on canned fish.

The agency is not yet ready to recommend a program with regard to the continuance of the present parity provisions of the Defense Production Act which set the basic framework for the control of most food prices. More time is needed to gain experience in its operation before changes can be proposed.

As yet, we have not begun to see the full effect of heavy expenditures required for national defense. It is difficult to foresee fully the effect on our economy of a national income far in excess of any previous level and at the same time a decreased supply

of many consumer goods to drain off surplus buying power.

Therefore, it becomes all-important that every necessary step be taken to protect those consumers with fixed incomes, to assure them an equal opportunity to purchase goods, and to maintain for them a standard of living in keeping with our national economy. And don't forget, in spite of the criticism of OPA, it is estimated that wartime price controls saved \$100 billion in the cost of the war. We are again entering a pe-

riod of heavy defense expenditures. We need to keep the cost at the lowest possible level.

This will be our objective and such an objective will require some sacrifice, many compromises, and certainly your help and cooperation. We invite this help and your active participation in this program of price stabilization. Only by working together can we reach the goal we seek in a way that will be best for you and for the American people.

SELECTIVE SERVICE AND THE FISHERIES

By Col. Lewis F. Kosch,
Chief, Manpower Division,
Selective Service System

In colonial times there was no question who would fight when the settlement was attacked. Everybody from grandmother and grandfather on down to the smallest tike, who could obtain and fire a musket, hurried to the defense and those who failed or refused to fight were ostracized by the community and became outcasts of society.

It is unfortunate in some respects that this same feeling persists to some degree in our modern society.

In the old days there was no question as to who should go, all went. In our day it is doubtful if we can economically support more than 10 percent of our population in uniform during a war of any great length. In these days wars are no longer fought by just the soldiers in the field, they are fought by the entire population. Some must don the uniform and shoulder a gun on the battle front; some must produce the food to feed the soldier and civilian alike; some must produce the materiel and machinery of war; some must produce the necessary essentials of our civilian economy; some must man our vast transportation systems to the effect that goods produced arrive expeditiously at the place where needed; some must furnish the ideas by which both our soldiers and civilians become more efficient; some must possess the know-how to put these ideas into practical application; and, some must furnish the brawn that is still necessary to accomplish some tasks in our complex economy. There's a place for everyone, the big job is to get each one where he can contribute the most to the national welfare. In time of peace prepare for war, for if we are properly prepared we may never need to fight. Each citizen has an equal duty to perform his share in the defense of his country. But even if we wished, we could not all volunteer and besides the volunteer system does

not always put the man in the place where he can do his country the most good. Congress, in passing the Selective Service Act of 1948, made wise provision for all phases of our national economy. I quote:

"The Congress hereby declares that an adequate armed strength must be achieved and maintained to insure the security of this Nation.

"The Congress further declares that in a free society the obligations and privileges of serving in the armed forces and the reserve components thereof should be shared generally, in accordance with a system of selection which is fair, and just, and which is consistent with the maintenance of an effective national economy.

"The Congress further declares that adequate provision for national security requires maximum effort in the fields of scientific research and development, and the fullest possible utilization of the Nation's technological,

scientific, and other critical manpower resources."

They also set up that segment of our male population which should furnish the men for our armed forces—nonveterans between 19 and 26 years of age. This group was further restricted by Executive Order to single males between 19 and 26 years of age.

They also set up a Selective Service System to register, classify and deliver those men to the armed services upon call. It is fair to assume that since this segment is so restricted as to make it necessary for practically every acceptable man in it to be taken to fill these calls that it was the intention of Congress that the military had priority in this group.

Selective Service is founded on the principle that each man should be so classified that he may render the greatest possible service to his country. In every age group there are some who possess special knowledge or skills which make them more valuable to their country in the supporting economy than in uniform. This age group probably contains fewer of these than any other age group and besides it contains those best fitted to withstand the rigors of military service.

To guide the system in classifying these registrants, regulations were promulgated by the President.

Classification of Registrants

The backbone of the classification system is the local board which is composed of unpaid neighbors in the registrant's home community. They make the initial classification of where the registrant can best serve his country, and this classification is final unless the case is appealed and the initial classification reversed. State appeal boards and a Presidential appeal board are provided for, to assure that the registrant, the employer, and the government secure justice in classification. Those who are classified in I-A or I-A-O have been selected for service in the armed forces. Since we all have a stake in this democracy we are all interested in having enough men in these classes to assure our nation's safety. I take it that you are all interested in who can be deferred in the national interest to remain in their civilian employment. These fall in general into class II-A for industry, and II-C for agriculture.

Class II-A: Registrant Deferred Because of Civilian Occupation (Except Agriculture): In Class II-A shall be placed any registrant whose employment in industry, or other occupation or employment, or whose continued service in an office under the United States, or any state, territory, or possession, or the District of Columbia, or whose activity in study, research, or medical, scientific, or



COL. LEWIS F. KOSCH

other endeavors is found to be necessary to the maintenance of the national health, safety, or interest.

Necessary Employment Defined: A registrant's employment in industry or other occupation, service in office, or activity in study, research, or medical, scientific, or other endeavors shall be considered to be necessary to the maintenance of the national health, safety, or interest only when all of the following conditions exist:

(1) The registrant is, or but for a seasonal or temporary interruption would be engaged in such activity;

(2) The registrant cannot be replaced because of a shortage of persons with his qualifications or skill in such activity; and

(3) The removal of the registrant would cause a material loss of effectiveness in such activity.

Length of Deferments in Class II-A: (a) Class II-A deferments shall be for a period of one year or less. If there is a change in the registrant's status during the period of the deferment in Class II-A, his classification shall be reopened and considered anew.

(b) At the expiration of the period of a registrant's deferment in Class II-A, his classification shall be reopened and he shall be classified anew. The registrant may be continued in Class II-A for a further period of one year or less if such classification is warranted. The same rules shall apply when classifying a registrant at the end of each successive period for which he has been classified in Class II-A.

(c) Nothing in this section shall be construed to require the local board to retain in Class II-A any registrant when the reason for his occupational classification has ceased to exist.

General Rules for Classification in Class II-A: (a) On the local board is placed the responsibility, under applicable rules and regulations, of deciding which men should be deferred because of their civilian activities. It is in the national interest and of paramount importance to our national security that civilian activities which are contributing to the national health, safety, or interest should be disrupted as little as possible, consistent with the fundamental purpose of the Selective Service Act of 1948.

(b) No deferment from training and service shall be made in the case of any individual except upon the basis of the status of such individual.

(c) The local board may avail itself of the assistance of all Federal, State, or local agencies to obtain information which will help it to determine whether a claim for occupational deferment should be granted.

Class II-C: Registrant Deferred Because of Agricultural Occupation: (a) In Class II-C shall be placed any

registrant who is employed in the production for market of a substantial quantity of those agricultural commodities which are necessary to the maintenance of the national health, safety, or interest.

(b) The production for market of a substantial quantity of agricultural commodities should be measured in terms of the average annual production per farm worker which is marketed from a local average farm of the type under consideration. The production of agricultural commodities for consumption by the worker and his family, or traded for subsistence purposes, should not be considered as production for market. Production which is in excess of that required for the subsistence of the farm families on the farm under consideration should be considered as production for market.

Length of Deferments in Class II-C: (a) Class II-C deferments shall be for a period of one year or less. If there is a change in the registrant's status during the period of deferment in Class II-C, his classification shall be reopened and considered anew.

(b) At the expiration of the period of a registrant's deferment in Class II-C, his classification shall be reopened and he shall be classified anew. The registrant may be continued in Class II-C for a further period of one year or less if such classification is warranted. The same rule shall apply when classifying a registrant at the end of each successive period for which he has been classified in Class II-C.

(c) Nothing in this regulation shall be construed to require the local

board to retain in Class II-C any registrant when the reason for his occupational classification has ceased to exist.

If the employer feels that his employee can make a greater contribution to the national interest by remaining in his civilian employment than he can in the armed service he should submit to the local board full and factual information upon which the local board can make a just decision. The registrant should do the same. The employer is entitled to take an appeal to the state board of appeal if he feels the local board classification is not just only if he has made claim for deferment to the local board prior to initial classification. He can appeal to the President if the decision of the state appeal board is not unanimous. If the decision is unanimous, he can appeal to the state or National Director who only can take an appeal in such cases. Don't wait until the registrant is classified and then start flooding the local board with information.

Remember, the Selective Service System is only concerned in the welfare of the nation when it makes its decisions and that justice under the law and regulations is meted out to the registrant and the employer. Deferments are not made for the financial benefit of either the registrant or the employer, except as it affects the welfare of dependents. We all must make sacrifices to ensure the safety of our life, liberty and property and those who have the most owe the most.

DEFENSE ACTIVITIES IN THE FISH AND WILDLIFE SERVICE

By Milton C. James, Deputy
Administrator, Defense
Fisheries Administration

Today, as in 1941, the Fish and Wildlife Service is recasting all its programs to provide maximum assistance for the national defense while continuing to discharge normal responsibilities. This paper will review briefly the responsibilities of the Service as a whole, and outline the organization and the tentative program of the new and separate Defense Fisheries Administration.

While priority will, of course, be given to defense requirements, we hope to maintain our game refuges and our fish hatcheries and to continue the research, enforcement, predator control, and other functions essential to wildlife and fishery conservation. Naturally, there will be no let-up in the effort to administer the Alaska salmon fisheries so as to yield a maximum, stable production. These programs must go forward not only in



MILTON C. JAMES

the interest of maintaining essential commercial supplies of seafood, but to preserve recreational resources of fish and game during and following the emergency.

As substantial quantities of scarce materials, normally used in the civilian economy, are taken for the military, shortages for normal use will, of course, occur again. Many of these shortages can be offset by the development and use of substitutes. Thus, the Fish and Wildlife Service will be prepared to investigate the applicability of substitute materials for containers for fishery products, for fishing nets and other fishing devices, for cordage, and for other requirements of the fisheries industry. Closely allied to these studies, there will be undertaken development work for improving the operation of fishing gear, and for the reduction in manpower in fishing operations. Exploration to expand fishing grounds will not be overlooked, nor will liaison with other agencies such as that maintained during World War II when Quartermaster Corps trainees obtained expert instruction on fish purchasing, handling, preparation, and cooking, and the Corps was given valuable laboratory help in such important undertakings as the development of field rations. Such liaison is again proposed.

As in World War II, the normal collection of statistical, marketing, and other economic data by the Service will not only be continued but augmented to form the basis for setting production goals, estimating potential food supplies, estimating industry's requirements for scarce materials, providing information as to the necessity of, and appropriate levels of price control and rationing, and for determining the desirability of fish allocation and concentration programs.

The utilization of regular personnel of the Service to provide the required supporting information mentioned above, and also for such necessary housekeeping functions as personnel and bookkeeping work will not only result in savings of money and men but permit us to keep the Defense Fisheries Administration a small, streamlined organization which can concentrate its efforts on implementing the defense program.

DFA Organization

Now as to the structure and activities of the Defense Fisheries Administration itself and the chain of responsibility within it:

Its birth certificate was the delegation to the Secretary of the Interior by the Secretary of Agriculture of that part of his authority over food which relates to the production of fishery products. These powers and responsibilities had been created by the Defense Production Act of 1950 and

vested in the President, who in turn parceled them out to Cabinet officers and other offices especially created for specific jobs.

In turn, the Secretary of the Interior established the Defense Fisheries Administration and redelegated to Albert M. Day, as Administrator, most of the authority. The Branches of Materials Facilities and Economic Facilities have been established to handle, respectively, programming and allocation of materials, and such problems as transportation, manpower, price, and rationing. Dr. Richard A. Kahn and Edward A. Power have been detailed to head the Branches of Economic Facilities and Materials Facilities, respectively. The staff will be augmented and field offices established as rapidly as the need for them becomes evident. Two Deputy Administrators have been selected: Maurice Rattray has given up his position as president of Anderson and Miskin to act as one, and I will act as the other. Fred Johnson is serving as Program Director and Roy Christey as Deputy Program Director. We believe that we have a team which knows the plays, from past experience, although we may have to learn some new signals.

Obviously, the Defense Fisheries Administration can't do what it is supposed to do by remote control. We must have close contact with the industry for the purpose of quickly and accurately obtaining and imparting information. This calls for a field organization and such an organization is being established with the intent of setting up offices in key fisheries centers manned by people who know the answers and who will act as eyes and ears for those of us who will be carrying on in Washington. We are not ready to announce all of our plans in this connection, but if your area looms very large in the fisheries picture, someone wearing a DFA label will ultimately be standing by to serve in any way possible. An announcement will be made publicly as these outposts are manned.

Also, we expect to resort liberally to industry advice and guidance through the medium of advisory groups and committees. The number, composition, and coverage of these committees is yet to be worked out, but here again you will be notified as to plans as soon as possible. After all, the Defense Fisheries Administration is barely two months old and has had funds with which to operate for little more than two weeks.

We entertain no hopes that the Defense Fisheries Administration will be able to provide as much of everything as the fishing industry would like to enjoy. If supplies of men and materials for civilian use were that ample, there would be no need to establish the organization, nor for government

controls to be placed in effect. Military requirements will take precedence and these requirements are now, and are expected to continue to be for a considerable time—so large that the civilian economy must go on shorter rations. However, we will endeavor to ensure that once military requirements are met, the commercial fishing industry gets an equitable share of the balance and that this share is distributed where it is most urgently needed.

Now, while I hope the foregoing recital of our aims and organization has been of some interest, I am sure your greatest concern is, "What does this all mean, in terms of troubleshooting, to overcome the hampering, restraining effects of emergency controls?" Troubleshooting is a never-ending job and since no two problems are ever alike, the starting point will generally be a fully documented knowledge of what causes the individual headache. Obviously, I cannot elaborate on what can be done to take care of individual hardship cases, but it is possible to touch upon some general principles which will govern our approach to spot problems.

Manpower

With reference to manpower, as yet the Defense Fisheries Administration has not been assigned any authority with respect to deferments, but we may be of some assistance and can point out the steps which can be taken by any employee or employer to insure full consideration of an individual case.

1. The employer or employee should discuss the facts with the appeal agent attached to the registrant's draft board, who may suggest a course of action.

2. The registrant may be able to offer new information concerning his occupational status and ask his draft board to reconsider his status in its light.

3. Even though his occupational status has not changed, a registrant or his employer may request an appeal of his current classification. An appeal should be requested within 10 days after a registrant receives his classification, but if it can be shown that the appeal procedure was not known to the registrant nor employer, the draft board may be requested to allow the appeal to go forward in spite of the lapse of the normal appeal period.

4. It is suggested that it be emphasized to the draft board or the appeal board that the fishing industry has been listed as an essential activity by the Department of Commerce for the guidance of the Department of Defense.

5. The attention of registrants should be called to Section 1622.15 of the Selective Service Manual which refers to "Registrants with Dependents."

I quote: "In Class III-A shall be placed a registrant whose induction into the armed forces would result in hardship to a person dependent upon him for support . . . dependency may be based upon other than financial consideration."

From this quotation it can be concluded that serious disturbances of cannery management—as for example, if an elderly cannery owner relies upon the assistance of his registrant-son in the management—can be considered a decisive reason in deferment cases. In fact, some cases of deferment, successfully recommended by officials of the Fish and Wildlife Service, were based on this general hardship clause.

6. Section 1622.12 of the Selective Service Manual states that a draft board "may avail itself of the assistance of all federal, state, or local agencies to obtain information which will help it to determine whether a claim for occupational deferment should be granted." You may inform a local draft board that any information which the Defense Fisheries Administration has available will be furnished on request.

We have talked with top representatives of the Director of Selective Service and have found that they are willing to cooperate with the Defense Fisheries Administration in any possible way. However, I think you will readily see that the facts must make the case, and no one knows the facts better than the parties immediately involved.

As far as calls of reserves and National Guardsmen to active duty are concerned, the Department of Defense is guided by the Department of Commerce "List of Essential Activities" and by the Department of Labor "List of Critical Occupations." While the fisheries are included as "Major Group 09" in the List of Essential Activities, no occupations in the fisheries have been included in the List of Critical Occupations. The Defense Fisheries Administration is exploring the possibility of including certain occupations of the fishery industries in the Critical List. Employers of reservists may suggest to the military department which issues the call to active duty that it ask the advice of the Defense Fisheries Administration in the respective case. Deferments because of dependents are not included in the "criteria"; however, it is the policy of the military departments to give consideration to hardship cases in the same way as local boards generally do.

Application for delay in call to active duty should be made when the reservist is called to active duty and be made in writing. The request may be made by the reservist or his employer. It also may be suggested that the Defense Fisheries Administration should be approached in order to give information in any case when the respective military department is in doubt about the importance of the civilian occupation of the reservist.

Materials Shortages

Our files indicate that fishery operators are already bucking shortages of some items of supplies, equipment, and material, minor in nature but nevertheless essential to efficient operation. I wish I could give you a formula that would guarantee your getting delivery of essential materials as required, but unfortunately, such is not the case. The current period of transition is a difficult one in which to operate, since new regulations are being issued almost daily.

Recently, however, material shortages have become so much more acute that the National Production Authority has considered issuance of a regulation which would provide means for satisfying requirements for maintenance repair and operating supplies (MRO) and has announced its intention of instituting a Controlled Materials Plan to provide for production materials and construction. No time has yet been set for inaugurating a Controlled Materials Plan.

Undoubtedly, the price and wage freeze recently instituted and the price regulations which are being developed are of paramount concern to you. The Defense Fisheries Administration has no direct responsibility or authority in this field, but we are keeping in close daily touch with developments and will do our utmost to see that the fishing industry receives due consideration, but we urge that you be as patient as possible both with us and the people only now being recruited for the Office of Price Stabilization. Please feel free to bring to our attention your particular problems, but we recommend this be done by letter rather than telephone or personal visit. Not that we aren't glad to see or talk with you, but because in many cases the rulings you wish have not yet been made and won't be for some time. Setting it down in writing often clarifies the point and permits us to present it in precise form to the individual or agency who can act upon it.

The National Production Authority has not required priority ratings on normal civilian orders. It is true that construction of certain nonessential facilities is prohibited, the use of cer-

tain materials is restricted as to end use or to varying percentages of a base period, and there is no doubt that additional restrictions will be instituted. In general, however, and except for a few specific directives, it has been the policy of the National Production Authority that rearmament orders only be given "DO" (Defense Order) ratings and that the remaining supplies be distributed as equitably as possible through normal channels among usual customers for all permitted uses.

There is a strong temptation to attempt to forecast the future course government controls will take, and particularly, to argue that the history of controls will repeat itself in the present emergency, but anything which might be said would be pure speculation and might prove quite erroneous. Our own course of action in the Defense Fisheries Administration will depend, to a great degree, upon the policies and orders adopted by the Defense Production Administration and other agencies and the food goals which may be established by the Department of Agriculture. During World War II, fish allocation programs were carried out for sardines in California and halibut in the Pacific Northwest. A salmon concentration program for Alaska saved manpower, transportation, and scarce materials, by consolidating the canning in a few centrally located canneries.

Similar programs may be needed again, but will be instituted only if necessary. Meanwhile, we have assembled the nucleus of a trained staff and will add to it, as may become necessary, men whose full-time job it will be to program the industry's essential requirements and review before issuance, as we have been doing, proposed orders in an endeavor to ensure that the needs of the industry are met as adequately as available supplies permit. As new orders appear, which restrict the use of materials or alter priority procedure, we will publicize the facts as best we can through trade associations, trade journals, and our own Market News Reports. And always, we will welcome your correspondence and will do anything in our power to help you solve any specific problem.

It will be our constant aim to interfere no more in the free economy than the proper discharge of our defense duties makes necessary. We will endeavor to hold paper work to a minimum and speed it through a small, streamlined staff. Finally, we will be watching for the earliest date on which each control can safely be relaxed or removed completely with the hope that somebody in the industry may be charitable enough to pronounce this valedictory: "They did the best they knew how."

RAW PRODUCTS CONFERENCE

A PRACTICAL FIELD CONTROL PROGRAM FOR CORN INSECTS

By George C. Decker, Illinois
Natural History Survey

Well over 100 species of insects attack corn. To mention only a few, we find white grubs, wireworms, rootworms, and some species of cutworms and aphids attacking the roots of the corn plant. Grasshoppers, chinch bugs, flea beetles, thrips, and armyworms attack any or all parts of the plant, and the European corn borer, the corn earworm, fall armyworms, Jap beetle, and sap beetles attack the ears. Since the canner is most interested in those species which damage the ears, we will eliminate the others from our immediate consideration and will largely restrict our discussion to the European corn borer and corn earworm problems.

Let us first define our problem. Insects are damaging the crop and yet the canner must produce a reasonably clean crop suitable for processing in his factory. He must, above all, pack a clean, sanitary product which will be acceptable to the discriminating customer and which will pass rigid inspection by the Food and Drug Administration. Labor conditions have changed materially. Time was when the sorters on the sorting belt felt a definite responsibility to their employer for satisfactorily performing their assigned task. Today, too many employees are interested only in the time clock and their paychecks, and they feel little or no moral responsibility for the proper and complete execution of their respective assignments. Plant managers can no longer rely upon their sorting crews to effectively eliminate the insects and insect-damaged portions of the ears passing over the sorting belt. The canner's immediate problem, therefore, is one of controlling insect pests in the field.

In this connection it is essential that he produce a maximum yield of corn at a minimum cost. At the same time, insect control operations must be adequate to provide a crop sufficiently clean that its proper processing in the factory will be assured.

One of the canner's first questions may well be, "What can be done to control the European corn borer and the corn earworm?" Incidentally, I might suggest that it is highly important that both be adequately controlled. Basically, European corn borer control should be a community project. One or a few individuals

cannot materially affect the over-all insect population of a community. Furthermore, no one single control measure will effectively regulate the trend of an insect population. The canner should, therefore, serve as a leader in his community and initiate the development of a community-wide corn borer control organization and program. Unfortunately, the canner is confronted with a "must" problem and if cooperation in the community is lacking, then he must proceed alone on a crop protection basis.

There is an abundance of research data to show that both the corn borer and the corn earworm can be effectively controlled though the proper use of insecticides. Numerous state and federal publications providing detailed recommendations and instructions are readily available. You will find in these publications detailed information on the material available for use, the arguments pro and con on the choice of materials, the use of dusts versus sprays, as well as the various types of equipment that is available for use.

The available research data tend to show that, following the recommendations now generally available, a four-treatment spray program will reduce the corn borer population by 90 to 95 percent and produce 95 to 98 percent clean ears, even in the face of very heavy corn borer and earworm infestations. Further, it has been shown that one properly timed treatment will produce 50 to 70 percent of this total result. Hence, the number of treatments required may be dependent upon the intensity of the infestation and the degree of perfection desired. Recent research not yet translated into recommendations seems to indicate that new methods of timing sprays may result in obtaining equally good results from one or two less treatments. Recent research also indicates that the addition of a suitable oil to the spray mixture will give better control of both earworm and corn borers attacking the ears of the plants.

The recommendations currently available have a certain degree of flexibility if the man in charge of insect control operations is properly trained and prepared to make important decisions. The number of treatments may be varied, dosage rates may be varied, and there are available choices of insecticides and equipment to be used. One cannot, however, cut all of the corners and expect to get the best obtainable results. It is essential that certain compensating values be taken into consideration when any substitutions are made to

the best available recommendations. The matter of timing insecticide applications is extremely important. You must have a suitable insecticide protecting proper parts of the plant at the proper time if good insect control is to be attained.

Some canners may ask, "Can I afford insect control?" To me, that is not the question. Can you afford not to control corn borer and the corn earworm? Can you afford to pay farmers for wormy corn? Can you afford to risk packing insects and thereby risk consumer rejection or FDA confiscation of your product? I think not. In this day and age, I think good insect control becomes an essential part of your production operations. Good insect control will pay its own way. The returns or dividends will appear at several points in the operation, and will be accumulative. Let me enumerate some of the benefits which we have observed, which include increased yield or tonnage per acre of from 8 to 30 percent; increased canning percent in cases per ton of 12 to 27 percent; reduced sorting and trimming costs of from 10 to 75 percent; and increased plant efficiency, or reduced overhead. When the sorting belt becomes the limiting factor in the production of your factory, every other machine and man in the plant is working at reduced efficiency, and your overhead is materially increased. In addition to the above benefits, with good insect control you may acquire some peace of mind. You may eliminate some sleepless nights of worrying over customer complaints or Food and Drug Administration confiscation and seizure of your product.

Some may say, "We will agree insofar as the European corn borer is concerned, but we can handle the corn earworm in our plants." In my opinion, the same factors which will pay dividends on good corn borer control will also pay dividends on good corn earworm control. Furthermore, I want to direct your attention to the fact that the help on your sorting belt cannot handle a 2 percent ear infestation by European corn borer in the presence of 25 to 50 percent infestation by corn earworm. The sorters will be so busy picking out the obvious corn earworm damaged ears that they will overlook the corn borer damage and you will inevitably find corn borers appearing in the packed product.

Now we come to the question of how you should proceed to accomplish good insect control, and my answer is only through adequate planning and hard work can you expect to succeed. It is not too difficult to attain a very high degree of insect control, and yet it is not so

simple that it can be attained by hazardous or halfway methods.

Insect control is an important part of your business. Why not give it the same consideration that you give the other problems encountered in your field and plant operation? Your top management spends days or even weeks studying market trends and planning your production. Your plant engineers are constantly studying machine operations and ways and means of improving plant efficiency. The farm managers spend considerable time in planning and laying out a detailed planting and harvesting schedule. You have expert specialists to solve your plant breeding and soil fertility problems—why not give the same consideration to your insect control problems?

An individual farmer may conceivably be able to keep in touch with his small acreage on a part time basis. However, in large operations this is not possible. To attain the desired degree of insect control, the canner will find it necessary to set up an efficient organization and develop a workable insect control program. The size and character of the organization required will depend to some extent on the size of the operation involved. In a large organization the work should be headed up by a competent entomologist, and even smaller plants may find it desirable to pool their interests and employ an entomologist to organize and direct the work for two or more independent units.

In either case, each plant should have one competent man assigned the responsibility for organizing, planning, and executing all insect control activity. He should be given ample time and opportunity to study and become fully acquainted with all of his important insect problems. He should be required to lay out a tentative work program in advance of each growing season. He should be supplied with adequate trained crews to effectively execute the program as planned. I have already pointed out that timing of insect control operations is usually all important. Too often, tomorrow may be too late. For that reason, field crews to supervise or conduct either ground rig or aerial application of insecticide must be trained in advance and available for call on very short notice.

In developing an insect control program, the entomologist or specialist assigned the responsibility for insect control work should take the following steps: (1) Procure and maintain up to date an adequate working library. (2) Become fully familiar with the local insect problems that have developed over a period of years and determine or estimate in advance each season's potential problems. (3) Determine equipment requirements and

get all units repaired and ready for use in advance of the season. (4) Select the insecticide to be used and order 50 to 80 percent of potential requirements in advance. (5) Select and train needed personnel, including field supervisors and operational crews. (6) Prepare working maps and tentative field treatment schedules, based on areas and planting dates. Locate convenient storage space and water supplies, if needed. (7) Conduct a running or continuous survey to keep up to date on both insect and crop development throughout the growing season.

If you will develop an organization and program as indicated above, I am quite certain of your success. If, on the other hand, your efforts are appreciably less than the requirements indicated, I can only suggest that you start praying for supernatural aid.

Let me say in closing, several companies now have organizations and programs such as I have outlined, and by and large their operations have been highly satisfactory. A number of other companies have tried various inferior methods of approaching the problem, and in many cases, at least, the results obtained were highly unsatisfactory. Many have become discouraged and pessimistic, without analyzing the reasons for apparent failures. May I suggest that I see no sin or disgrace attached to the making of a mistake, but if the same mistake is made a second time, someone should be called upon for an accounting. If it happens a third time, someone should be replaced, that is, unless a satisfactory and workable program has been developed and presented and vetoed by a vice president, in which case perhaps a reconsideration of the proposed program would be in order.

Food Standards Meetings

Separate industry meetings were held at the Convention to discuss progress on Food and Drug standards for pineapple, tuna, and tomatoes and tomato products.

Pineapple Standards

Canners from Hawaii and Puerto Rico met to discuss details of the proposed standards for canned pineapple. The proposals that have been made appear to be fairly complete, but certain questions require further studies, and arrangements were made to carry on the work during the coming season. Another meeting of the group will be held in June to give more extended consideration to the data that have been accumulated.

Tuna Standards

The canners of tuna who were in attendance at the Convention were in-

vited to meet and hear the report of the Standards Committee which has been working on this subject for some time. The Standards Committee made a full report of its investigations and there was extended discussion of many of the features of the report. The examination of the samples that have been prepared is not yet complete. When its work is finished, the Standards Committee will make a complete report to the industry.

Tomatoes and Tomato Products Standards

In response to the invitation, a group of about 40 canners of these products met to discuss two specific proposals that have been made. With reference to canned tomatoes, it has been proposed that the requirement for a statement on the label whenever strained tomatoes are used as a packing medium be changed from a mandatory requirement to an optional requirement. It was pointed out that in canning tomatoes, at times the peeled tomatoes do not yield enough liquid to furnish packing medium. In such instances, it is necessary to prepare liquid from other tomatoes and, according to the present requirements, such few cans would have to have a separate label statement. This condition exists intermittently and it is felt that no useful purpose is served by making the requirement that such few cans be set aside and labeled separately. All of those at the meeting agreed that it was in the interest of everyone to have this labeling requirement made optional. Since the entire group was in agreement on this suggestion, it was agreed that the National Canners Association would take steps to request that the standard of identity for canned tomatoes be amended by deleting this one sentence of the labeling requirement.

The other proposal had to do with canned concentrated tomato juice. The Chicago Quartermaster office has put out a tentative proposal for the manufacture of this product for Army requirements. This particular product is not listed with the standards of identity for canned tomato products and the discussion was suggested to see whether there was any considerable interest in the preparation of such a product. Many of the people at the meeting expressed an interest in such a product and several said that experimental batches had been prepared and that they were impressed with the possibilities of the product. One firm said that it was opposed to the introduction of such a concentrated product in the merchandising of tomato products. It was suggested that further studies be carried on by different sections of the industry.

N.C.A. OFFICERS AND DIRECTORS

H. J. BARNES ELECTED 1951 PRESIDENT OF N.C.A.; FRED C. HEINZ VICE PRESIDENT; BOARD OF DIRECTORS

Herbert J. Barnes, vice president of the Kaysville Canning Corp., Kaysville, Utah, was elected 1951 President of the National Canners Association at the General Session.

Mr. Barnes succeeds Henry P. Taylor, president of Taylor & Caldwell, Inc., Walkerton, Va.

Fred C. Heinz, special assistant to the president of the H. J. Heinz Co., Pittsburgh, was elected 1951 Vice President of N.C.A.

Carlos Campbell of Washington, D. C., was named by the Board of Directors to be Secretary-Treasurer. He had been Secretary of N.C.A. since 1945.

The N.C.A. membership elected 22 Directors to three-year terms; the terms of 48 members of the Board of Directors were held over.

Mr. Barnes has taken active leadership in industry affairs. He served on the Board of Directors in 1930-32 and 1941-43, the Administrative Council in 1942, and has served on numerous Committees, including terms as chairman.

His service includes terms on the Raw Products Committee, 1937-44; as chairman, 1945 and 1946; and member of the Committee, 1947; War Council, 1942; Finance Committee, 1942-1950; Planning Committee, 1945; Resolutions Committee, 1945; Research Advisory Council, 1946-48; Home Economics Committee, 1947-49; Research Advisory Committee, 1949; Western Branch Laboratory Advisory Committee, 1947-49; and Western Laboratory Building Committee, 1947.

Mr. Heinz has been prominent in war period planning by the Association. During World War II he was a member of the N.C.A. Planning Committee, and he is a member of its 1951 counterpart, the War Mobilization Committee, in which he also serves as Chairman of its Procurement Group. One of his outstanding contributions to the N.C.A. was to head the successful drive for contributions from canning industry supply firms to the \$1,500,000 fund that made possible the new headquarters building in Washington and the laboratory building being completed in Berkeley, Calif.

N.C.A. Board of Directors

Directors Elected for Three Years

Frank Armstrong, Jr., National Fruit Products Co., Winchester, Va.
Charles H. Bailey, Monmouth Canning Co., Portland, Me.
A. Edward Brown, Michigan Fruit Canners, Inc., Benton Harbor, Mich.
N. C. Buckles, Quality Food Products Co., Bradford, Ohio
J. Glen Brubaker, Hemet Packing Co., Hemet, Calif.
R. D. Cleaveland, The H. J. McGrath Co., Baltimore, Md.
Mrs. M. F. Counter, Fort Lupton Canning Co., Fort Lupton, Colo.
S. K. Ferguson, Lakeside Packing Co., Manitowoc, Wis.
Robert A. Friend, Friend Bros., Inc., Melrose, Mass.
J. D. Hendrickson, Columbia River Packers Assn., Astoria, Ore.
Spencer R. Keare, The Illinois Canning Co., Hoopeston, Ill.
M. E. Knouse, Knouse Foods Coop., Inc., Peach Glen, Pa.
H. E. MacConaughy, Hawaiian Pineapple Co., Ltd., San Francisco, Calif.
Stanley Macklem, Curtice Brothers Co., Rochester, N. Y.
Philip N. Mark, Tri-Valley Packing Assn., San Francisco, Calif.

Ivan Moorhouse, Olympia Canning Co., Olympia, Wash.
Reynold H. Peterson, Big Horn Canning Co., Cowley, Wyo.
L. E. Shannon, Otee Food Products Co., Nebraska City, Nebr.
Angus G. Stevens, Stevens Canning Co., Ogden, Utah
Alfred J. Stokely, Stokely-Van Camp, Inc., Indianapolis, Ind.
Al Vignolo, Jr., West Coast Packing Corp., Long Beach, Calif.
Newlin B. Watson, R. S. Watson & Son, Greenwich, N. J.

Directors Whose Terms Held Over

Floyd Asher, Clarksville Canning Co., Clarksville, Iowa
Frederic H. Bird, Medomak Canning Co., Rockland, Me.
E. R. Blackinton, Blackinton & Son Canning Co., Ogden, Utah
Milton E. Brooding, California Packing Corp., San Francisco, Calif.
E. E. Burns, Alton Canning Co., Inc., Alton, N. Y.
E. C. Christensen, Christensen Products Corp., Weslaco, Tex.
S. R. Clevenger, Bush Brothers & Co., Dandridge, Tenn.
J. E. Countryman, California Packing Corp., Rochelle, Ill.
Harry Draper, Draper Canning Co., Milton, Del.
S. A. Ferrante, Oxnard Canners, Inc., Monterey, Calif.

G. E. Finch, Edgett-Burnham Co., Newark, N. Y.
William H. Foster, Stokely Foods, Inc., Oakland, Calif.
Carleton A. Friday, Friday Canning Corp., New Richmond, Wis.
W. W. Giddings, Snively Groves, Inc., Winter Haven, Fla.
W. Howard Green, Concord Foods, Inc., Concordville, Pa.
Orlin C. Harter, Harter Packing Co., Yuba City, Calif.
Henry McK. Haserot, Hawaiian Canners Co., Ltd., Kapaa, T. H.
Fred C. Heinz, H. J. Heinz Co., Pittsburgh, Pa.
Dale Hollenbeck, Thornton Canning Co., Thornton, Calif.
F. Lowden Jones, Walla Walla Canning Co., Walla Walla, Wash.
R. W. Jones, R. W. Jones Canning Co., Inc., Arlington, Ind.
Russell B. Kline, Stokely-Van Camp, Inc., Celina, Ohio
A. T. Leatherbury, Eastern Shore Canning Co., Inc., Machipongo, Va.
Julian McPhillips, Southern Shell Fish Co., Harvey, La.
Keith More, Merrell Canning Co., Harlan, Iowa
Maxwell N. Naas, The Naas Corp. of Indiana, Portland, Ind.
John F. O'Hara, Davis Bros. Fisheries Co., Inc., Gloucester, Mass.
John A. Owen, Pratt-Low Preserving Co., Santa Clara, Calif.
Albanus Phillips, Jr., Phillips Packing Co., Inc., Cambridge, Md.
E. I. Pitkin, Eugene Fruit Growers Assn., Eugene, Ore.
Paul H. Ploeger, The Ploeger-Abbott Co., Darien, Ga.
Earl A. Randall, North Ogden Canning Co., Ogden, Utah
Arthur L. Reiling, Birds Eye-Snyder Division, General Foods Corp., Hillsboro, Ore.
G. C. Scott, Green Giant Co., Le Sueur, Minn.
James M. Shriver, The B. F. Shriver Co., Westminster, Md.
T. C. Slaughter, T. C. Slaughter Co., Reedville, Va.
Russell M. Smith, Wilson & Co., Inc., Chicago, Ill.
John W. Speyer, Kauai Pineapple Co., Ltd., Kalaheo, T. H.
Joseph M. Steele, Steele Canning Co., Springdale, Ark.
Stran Summers, Charles G. Summers, Jr., Inc., New Freedom, Pa.
O. L. Teagarden, The J. Weller Co., Oak Harbor, Ohio
Lester Wass, Machiasport Canning Co., Eastport, Me.
Ernest M. Weisner, Gerber Products Co., Fremont, Mich.
E. E. Willkie, Libby, McNeill & Libby, Chicago, Ill.
Robert Wilson, Faribault Canning Co., Faribault, Minn.
R. H. Winters, The Larsen Co., Green Bay, Wis.
Arthur W. Wittig, Port Ashton Packing Corp., Seattle, Wash.
J. Hollis Wyman, Jasper Wyman & Son, Millbridge, Me.

1951 Finance Committee

The personnel of the Finance Committee was approved at the General Session. As announced by President Barnes, it is as follows:

Henry P. Taylor, *Chairman*, Taylor & Caldwell, Inc., Walkerton, Va.

H. J. Barnes, Kaysville Canning Corp., Kaysville, Utah

John L. Baxter, H. C. Baxter & Bro., Brunswick, Me.

E. B. Cosgrove, Green Giant Co., Le Sueur, Minn.

Howard T. Cumming, Curtice Brothers Co., Rochester, N. Y.

S. B. Cutright, Illinois Canning Co., Hoopeston, Ill.

Clinton W. Davis, Portland Packing Co., Portland, Me.

Ralph O. Dulany, John H. Dulany & Son, Inc., Fruitland, Md.

A. T. Flynn, Reid, Murdoch Co., Chicago, Ill.

William A. Free, Hungerford Packing Co., Hungerford, Pa.

Frank Gerber, Gerber Products Co., Fremont, Mich.

Walter L. Graefe, Pomona Products Co., Griffin, Ga.

Herbert E. Gray, Barron-Gray Packing Company Div., Hawaiian Pineapple Co., Ltd., San Jose, Calif.

Francis A. Harding, William Underwood Co., Watertown, Mass.

G. Sherwin Haxton, Haxton Foods, Inc., Oakfield, N. Y.

Harold J. Humphrey, Birds Eye-Snyder Div., General Foods Corp., New York, N. Y.

Marc C. Hutchinson, Michigan Fruit Canners, Inc., Fennville, Mich.

Adolph C. Ketzler, Bordo Products Co., Chicago, Ill.

Herbert F. Krimendahl, Stokely-Van Camp, Inc., Indianapolis, Ind.

Carroll E. Lindsey, Lakeland Highlands Canning Co., Highland City, Fla.

R. G. Lucka, California Packing Corp., San Francisco, Calif.

H. E. MacConaughy, Hawaiian Pineapple Co., Ltd., San Francisco, Calif.

John F. McGovern, Green Giant Co., Le Sueur, Minn.

Fred M. Moss, Idaho Canning Co., Payette, Idaho.

Art Oppenheimer, Marshall Canning Co., Marshalltown, Iowa.

Robert C. Paulus, Paulus Bros. Packing Co., Salem, Ore.

E. N. Richmond, Richmond-Chase Co., San Jose, Calif.

H. N. Riley, H. J. Heinz Co., Pittsburgh, Pa.

Emil Rutz, Schuckl & Co., Inc., Sunnyvale, Calif.

R. L. Smith, Kuner-Empson Co., Brighton, Colo.

OFFICERS ELECTED BY OTHER ASSOCIATIONS

Officers of other trade associations, elected at their annual meetings during the Convention period, are as follows:

National Food Brokers Association

National chairman—Roy C. Osman, The Paul E. Kroehle Company, Cleveland; first vice chairman—Clarence Wendt, Allison & Wendt, Oklahoma City; second vice president—E. Norton Reusawig, Lestrade Bros., New York; third vice president—Willis Johnson, Jr., Willis Johnson Company, Little Rock; member-at-large—George E. Dougherty, Dougherty Vert Company, Minneapolis; treasurer—Harry E. Cook, The Harry B. Cook Company, Baltimore (reelected); president—Watson Rogers, Washington, D. C. (reelected).

Canning Machinery & Supplies Association

President—Eugene A. Hildreth, Owens-Illinois Glass Company, Toledo (reelected); vice president—Hal W. Johnston, Stecher-Traug Lithograph Corp., Rochester, N. Y. (reelected); secretary-treasurer—S. G. Goraline, Battle Creek, Mich. (reelected).

Young Guard Society

President—William N. Hughes, Chisholm-Ryder Co., Columbus, Wis.; first vice president—William A. Free, Hungerford Packing Co., Hungerford, Pa.; second vice president—Charles Scharnberger, Crocker Union Co., Chicago; treasurer—Robert W. Mairs, Winter Garden Citrus Products Coop., Winter Garden, Fla. (reelected); secretary—Robert L. Elrich, Crocker Union Co., Baltimore (reelected); recording secretary—Arthur J. Judge, The Canning Trade, Baltimore (reelected).

J. B. Weix, Oconomowoc Canning Co., Oconomowoc, Wis.

Oliver G. Willits, Campbell Soup Co., Camden, N. J.

E. E. Willkie, Libby, McNeill & Libby, Chicago, Ill.

Paul H. Wolf, Roach-Indiana Corp., Gwynneville, Ind.

Special Convention Appearances

During the Convention, officers of the N.C.A. make special radio and other public appearances.

President Henry P. Taylor was a principal speaker on the program

Old Guard Society

President—F. H. Van Eenwyck, Fruit Belt Preserving Co., East Williamson, N. Y.; first vice president—Ogden S. Sells, Food Machinery Corp., Riverside, Calif.; second vice president—Walter Glascoff, Canned Foods, Inc., Waupun, Wis.; secretary-treasurer—S. G. Goraline, Battle Creek, Mich. (reelected).

National-American Wholesale Grocers Association

President—Sherwin A. Hill, Lee & Cady, Detroit; vice presidents—Charles S. Eaton, S. S. Pierce Co., Boston; J. B. Maltby, J. B. Maltby Co., Corning, N. Y.; Edward Sweeney, Sweeney & Company, San Antonio; and Paul Tell, Akron Coffee & Grocery Co., Akron; treasurer—J. Stanley Seeman, Seeman Bros., Inc., New York, N. Y. (reelected).

National Preservers Association

President—C. R. Zimmermann, Barnes and Zimmermann, Inc., New Brighton, Minn. (reelected); vice presidents—R. J. Glaser, Glaser, Crandall Co., Chicago (reelected), T. E. McCaffray, National Fruit Canning Co., Seattle (reelected), Leo Abrahams, General Preserve Co., Inc., Brooklyn; secretary-treasurer—John C. Fosgate, Chester C. Fosgate Co., Orlando, Fla. (reelected); managing director—W. Lowe Walde, Washington, D. C. (reelected).

Association of Canners State and Regional Secretaries

President—C. R. Tulley, Northwest Canners Association, Portland, Ore.; vice president—Calvin R. Skinner, Tri-State Packers Association, Easton, Md.; secretary-treasurer—J. Overby Smith, Texas Canners Association, Weslaco, Tex.

of the National-American Wholesale Grocers Association at the Drake Hotel, February 15.

President-elect H. J. Barnes recorded a radio-interview for the Station WGN program "Bob Elson, On the Century," at the LaSalle Street Station, February 19.

Secretary-Treasurer Carlos Campbell was guest speaker on the radio program "The Northerners," at Stations WGN and WGNB, on February 20.

Also, Miss Katherine R. Smith, Director of the Home Economics Division, was one of two food industry home economists who served as honorary co-chairmen of judging and in an advisory capacity at the National Cherry Pie Baking Contest at the Morrison Hotel February 21.

CONVENTION RESOLUTIONS

The annual report of the Resolutions Committee of the National Canners Association was presented at the General Session by Chairman Chester A. Ray, who read the full text of the resolutions. They were unanimously voted and approved.

In addition to the resolutions reproduced below, the Resolutions Committee proposed a resolution paying tribute to the late Frank E. Gorrell, founding Secretary of N.C.A. This resolution was presented by President Henry P. Taylor at the opening of the General Session and is reproduced on page 65.

Mobilization for Defense

Resolved, that each member of the canning industry pledges his full support of the national mobilization effort and of the program for the production of canned foods in an amount adequate both to maintain the civilian supply and to meet the needs of the expanding armed services.

Requirements for Full Production

Experience during World War II abundantly demonstrated to the nation the essentiality of canned foods. The canning industry is proud of its record of sustained production at reasonable prices. Maintenance of production of canned foods—upon which the armed forces and the civilian population are so largely dependent—requires that any sound mobilization program insure to the canning industry, through governmental cooperation, its raw materials, productive facilities, and necessary manpower. Stabilization controls must recognize the seasonal character of the industry in providing timely and nondiscriminatory treatment under regulations available early enough to permit canners to undertake with confidence their necessary advance commitments. Failure to allow a fair and equitable processing margin on each food product will constitute an immediate and drastic impediment to needed full production.

Tin

The canning industry will be zealous in making any necessary sacrifices in the national interest. Yet the industry is firm in its conviction that conservation of strategic and critical materials must be founded on the relative essentiality of end use. Foremost among these is the maintenance of plentiful supplies of canned foods in metal containers adequate both for

normal distribution and emergency conditions. So long as other uses of tin and steel, of lesser importance to the defense effort, are permitted, the canning industry both in its own and in the broader consumer and national interests, voices its unalterable objection to any quantitative restriction of the use of tinplate in the packing of any canned food. The industry further recommends that in any necessary regulation controlling tinplate usage there should be appropriate provision for timely and flexible adjustment to present individual hardships and inequities which have and may arise.

Necrology

The Association mourns the loss during the year of these men and women for whose warm friendship we remain grateful and for whose contributions to its welfare the industry owes an immeasurable and everlasting debt of gratitude:

C. Edgar Anderson
Miss Ruth Atwater
Elton F. Cornoll
Louis P. Filice
Spencer Gordon
Charles W. Griffin
T. C. Hayes
Robert Heini
B. J. Howard
Carl N. Lovegren
J. V. McInnes
Thomas M. Rector
George Sauter
Paul F. Shorb
Mrs. O. E. Snider
Carl A. Sutter
Charles A. Winkler
Brig. Gen. A. D. Hopping
Col. Clifford C. Wagner

Henry P. Taylor

Modesty is a happy attribute in a man of great capacity. The leadership of Henry P. Taylor in these dynamic times has been a source of strength to the Association and the canning industry. His grasp of current problems has been sure, founded upon knowledgeable experience, and grounded in constant and courageous adherence to what he regards as the fundamental principles of hard work, self-reliance, and responsibility to others. With these he has coupled genuine modesty, ineffable charm, and an abiding good humor. Seldom has the path to wise action been so splendidly illuminated by apt parable and searching homily. To him each member of the industry expresses

personal esteem and deep appreciation for a trying job superbly done.

Association Staff

Mobilization has brought problems of great magnitude and increased complexity to the canning industry and the Association. They count themselves fortunate in having available the experience, skill, and broad knowledge of Secretary Carlos Campbell and his loyal and efficient staff. To each of them the industry renews its expressions of continuing gratitude for unceasing effort and arduous tasks well done.

C.M.&S.A. Resolution On Death of Frank E. Gorrell

A resolution of sorrow on the death of Frank E. Gorrell, founding Secretary of the National Canners Association was passed by the members of the Canning Machinery & Supplies Association at its annual meeting. The resolution follows:

"It is with deepest sorrow that we record the death of Frank E. Gorrell, Founding Secretary of the National Canners Association, on Tuesday, January 16, 1951 in the 83rd year of his life.

"Frank, as he was affectionately known throughout the Canning Industry, founded the National Canners Association at Bel Air, Maryland, in 1907. In succeeding years he moved with it to national prominence through the standardization and evaluation of food preparation in its Washington laboratories, its food procurement programs of two world wars and countless other contributions to the welfare of a growing industry in a growing nation. As quiet on some issues as he was outspoken on others, Frank won and sustained the lasting loyalty of those who had occasion to work with him.

"From his retirement as Secretary in 1945, he served as counselor to the Association until the day of his death. The industry of which he was such a vital part and to which he gave abounding energy, good counsel and guidance for most of his years will long cherish his memory.

"It is, therefore, Resolved that this tribute of esteem and appreciation of the qualities of Frank E. Gorrell be spread upon the minutes of this Association.

"It is further Resolved that a copy of this Resolution be presented to his family and to his Associates in the National Canners Association, to whom we extend our heartfelt sympathy in their bereavement."

MEETING OF N.C.A. DIRECTORS

Plans for the next meeting of the Board of Directors to be held in conjunction with dedication of the Association's new Western Branch Laboratory building in Berkeley, Calif., were prominent in considerations by the Board at its meeting in Chicago February 16.

Because the new West Coast laboratory is scheduled for completion in May, it is tentatively planned that the annual Spring meeting of the Board will be held in San Francisco at that time. However, this question was left to the Executive Committee with the recommendation that if conditions are favorable, the dedication and Board meeting be scheduled at the same time.

The Board heard the report of H. E. Gray, chairman of the Western Building Subcommittee, that the Berkeley building is about 65 percent completed. He said that fixtures for the laboratory will not be received in time for installation by the end of May but that the executive offices should be completed by that time. The prospective date for completion is July 1.

The Board approved the recommendation of the Labeling Committee, presented by John L. Baxter, that the Association's labeling program be revitalized immediately and supported energetically. One of the objectives, Mr. Baxter stated, is to have a new labeling manual in the hands of canners by October. Questionnaires, on which canners will be asked to express preference on what terms should be included, will be sent out. The Board approved the Administrative Council's recommendation for additional funds for laboratory work on labeling terms.

Association Finances

Following a discussion of Association finances as of the close of 1950, the Board approved the budget submitted by the Administrative Council, anticipating 1951 operating costs at \$1,027,795.

The Administrative Council's recommendation for a 20 percent increase in the rate of Association dues also was approved. The rate of dues for 1951 thus was fixed at four-tenths of a cent per case on seasonal products and two-tenths of a cent per case on nonseasonal products.

The Board also amended the N.C.A. By-Laws by establishing a new classification of members—Associate Members. Canners operating outside of the United States and its territories, but within the continent of North America and meeting other requirements for membership, are eligible to become Associate Members. They will pay a flat dues rate of \$250 a year and will be entitled to such services as the

Board shall from time to time prescribe.

Secretary Carlos Campbell was appointed by the Board to be Secretary-Treasurer. Historically, it was said, the two offices had been held jointly and it was suggested that the two be consolidated again.



Construction of the N.C.A. Western Branch Laboratory building in Berkeley, Calif., is progressing satisfactorily, according to a report to the Board on February 16 by the Western Building Subcommittee, which indicated that the building will be completed in May and that laboratory equipment will be installed in July. However, no date for occupancy by the laboratory staff can be accurately forecast.

All of the concrete has been poured, the tar and gravel roof is on, and window sash is being installed. Early

Association Committees Reconstituted

Howard T. Cumming, chairman of the N.C.A. War Mobilization Committee, outlined the work and functions of that committee, and the Board adopted a resolution extending the life of that Committee.

The Board also adopted a resolution reconstituting the Conference and Convention Committees as Special Committees of the Association.

in the fall, the contractor and his sub-contractors were asked to put aside the materials needed for this building. Most of the new equipment and furnishings have been received at the building site or are being warehoused by suppliers, for delivery when called for, it was reported.

The Western Building Subcommittee reports that all who have followed construction of the new building are enthusiastic about the project and feel that the N.C.A. West Coast headquarters will be adequate and comfortable when the building is completed.

Fruit and Vegetable Canners' Industry Advisory Committee

Following is the membership of the Fruit and Vegetable Canners' Industry Advisory Committee created by the Production and Marketing Administration, U. S. Department of Agriculture:

John L. Baxter, H. C. Baxter & Bro., Brunswick, Me.
R. D. Cleaveland, The H. J. McGrath Co., Baltimore, Md.
Howard T. Cumming, Curtice Brothers Co., Rochester, N. Y.
W. F. Dietrich, Green Giant Co., Le Sueur, Minn.
Fred C. Heinz, H. J. Heinz Co., Pittsburgh, Pa.
Dale Hollenbeck, Thornton Canning Co., Thornton, Calif.
Marc C. Hutchinson, Michigan Fruit Canners, Inc., Fennville, Mich.

Glen Knouse, Knouse Foods Cooperative, Inc., Peach Glen, Pa.
H. F. Krimendahl, Stokely-Van Camp, Inc., Indianapolis, Ind.
William C. Kunzman, Kuner-Empson Co., Brighton, Colo.
Roy G. Lucka, California Packing Corp., San Francisco, Calif.
W. K. McCracken, Treesweet Products Co., Santa Ana, Calif.
Robert C. Paulus, Paulus Bros. Packing Co., Salem, Ore.
Louis Ratzesberger, Jr., Illinois Canning Co., Hoopeston, Ill.
Lee Recker, Adams Packing Association, Inc., Auburndale, Fla.
J. R. St. Clair, St. Clair Foods Co., Ltd., McAllen, Tex.
Oliver G. Willis, Campbell Soup Co., Camden, N. J.
E. E. Willkie, Libby, McNeill & Libby, Chicago, Ill.
S. R. Smith, Chief, Fruit and Vegetable Branch, PMA—Government Chairman
Floyd F. Hedlund, PMA—Government Vice Chairman

Convention Proceedings

(Concluded from page 51)

participated in the earlier meetings of the War Mobilization Committee, of which he is Procurement Chairman, and in the Administrative Council meeting, but was called back to Pittsburgh because of the death of his mother. Mr. Heins returned to the Convention for the closing activities which were particularly important with respect to procurement.

Technical Sessions

Canning Problems Conferences were conducted by the N.C.A. Laboratories Monday, February 19. On Tuesday morning, February 20, the Laboratories and the N.C.A. Raw Products Bureau conducted a joint conference on the problem of added chemicals. Papers at all these conferences are reproduced in this issue, as are the addresses made at the Fishery Products Conference on Tuesday, February 20.

The Raw Products Bureau also held conferences on Monday, February 19. Summaries of two panels conducted at these conferences, prepared by Director Charles H. Mahoney, follow:

Heat Unit Panel

Basic factors of climatology and plant physiology in the growth of peas and corn, upon which the successful use of the heat unit technique for planting and harvesting canning crops rests, were outlined. The principles involved in using the method to set up a planting schedule were discussed in detail, followed by a presentation of refinements in the use of the technique and their possible application by individual companies. Correction factors for soil types, regional locations, and rate of development of different varieties were some of the refinements discussed.

Most of the discussion revolved around the use of the heat unit technique in growing peas and corn but research personnel from the Maryland and Ohio Experiment Stations discussed its use in planting and harvesting snap beans.

The consensus seemed to be that the method is extremely useful in formulating planting schedules and predicting harvest dates if it is used intelligently by experienced personnel. Emphasis was placed upon the importance of working out the necessary corrective factors by canners in order to make the method more precise under specific conditions. The value of this technique in providing education for the field man was also stressed, since it "points up" the importance of intelligent evaluation of the growth and development of the crop.

Machinery Panel

Industry personnel from canners' agricultural production departments

thoroughly covered the subject of "Labor-Saving Equipment for the Production and Harvesting of Canning Crops." Among crops discussed for which equipment is now available or in process of development were peas, corn, beets, carrots, spinach, and beans.

Detailed information, based on individual experience, obtained in areas where these crops are extensively grown, was given by members of the panel. This included comparisons of operating costs, efficiency of performance of equipment, effect of equipment on quality, speed of harvesting, best utilization of labor, and other points. Special attention was given to an evaluation of the various standard methods of pea harvesting and vining and to comments on experiences obtained in the use of mobile viners and the pea combine.

Various types of equipment for spraying and dusting canning crops, more particularly control of second generation corn borers on tall sweet corn, were thoroughly discussed also.

This discussion was designed to stimulate development of effective and economical harvesting equipment for canning crops.

Supplementary Requirements Of the Armed Services

The following letter was sent by the N.C.A. to all fruit and vegetable canners on February 20, following up the industry's effort to assist the armed services in procuring the balance of their canned foods requirements from the 1950 pack.

To All Fruit and Vegetable Canners:

You learned in Chicago last week that the armed services greatly need additional canned food items from existing stocks. When Brig. Gen. Everett Busch, the Commanding General of the Chicago Quartermaster Depot, addressed the special canner-distributor meeting on Tuesday morning, he listed, as shown on the attached table, the irreducible minimums of certain commodities required from present stocks by the armed services to carry them through 1951.

These quantities have been partially met by contracts arranged as a result of the Chicago appeal. Remaining quantities needed by the Quartermaster from the 1950 pack also are listed.

The turn-out at the Tuesday morning meeting organized by the Association and the results of that meeting in terms of offerings is a most gratifying example of industry unselfishness and cooperation in the public interest. It has made your War Mobilization Procurement Committee exceedingly proud of the canned foods

industry. The job, however, is not completed.

Since quantities of peas, corn, snap or green beans, tomatoes, tomato products and other items must still be obtained through voluntary methods of procurement, it is suggested that you canvas your stock position, with a view toward offering your proportionate holdings of the required items. It is appreciated that generally these commodities are no longer wholly within your control. It may be necessary for you to obtain releases from those to whom the merchandise has been sold. Prorating is understood and that method of obtaining equitable treatment should be recognized by buyers in the present situation.

To assist you in appraising your relative position, the stock figures as of February 1 are included in the attached table.

We strongly urge that you offer your proportionate share of the armed services' requirements to the Chicago Depot immediately.

National Canners Association
Carlos Campbell, Sec.-Treas.
Fred C. Heins, Chairman,
War Mobilization Procurement Committee

Remaining Armed Service Requirements from 1950 Packs

The following table shows the remaining armed service requirements from the 1950 pack as of February 20, the day on which Brig. Gen. Busch spoke to the industry meeting in Chicago, and as of February 26. Also shown are the February 1 canners' stocks on the products for which reports are available.

Please offer immediately your equitable share of the vegetable items to the Office of the Quartermaster General, Chicago Depot, 1819 West Pershing Road, Chicago 9, Ill.; and the fruit items to the Office of the Quartermaster General, Oakland Depot, Oakland, Calif.

Product (basis 24/24's)	VEGETABLES		Canners' Stocks Feb. 1
	—Requirements—		
	Feb. 20	Feb. 26	
Asparagus . . .	74,000	70,000	
Beans, lima . . .	245,000	52,000	2,239,000
Beans, green or snap . . .	333,000	244,736	
Carrots . . .	214,000	16,656	
Caulap. . .	279,000	235,054	
Corn . . .	966,000	709,634	9,271,000
Peas . . .	576,000	817,199	8,145,000
Sweetpotatoes . .	249,000	80,118	
Spinach . . .	87,000	33,582	
Tomatoes . . .	1,136,000	1,132,719	2,600,000
Tomato juice . . .	815,000	581,400	10,087,000
Tomato paste . . .	192,500	100,000	
Tomato puree . . .	160,000	160,000	

Product (basis 24/24's)	FRUITS		Canners' Stocks Feb. 1
	—Requirements—		
	Feb. 20	Feb. 24	
Figs	164,644	64,000	
Peaches	392,933	176,000	3,931,000
Pears	273,576	66,000	2,310,000
Plums	119,711	44,000	

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